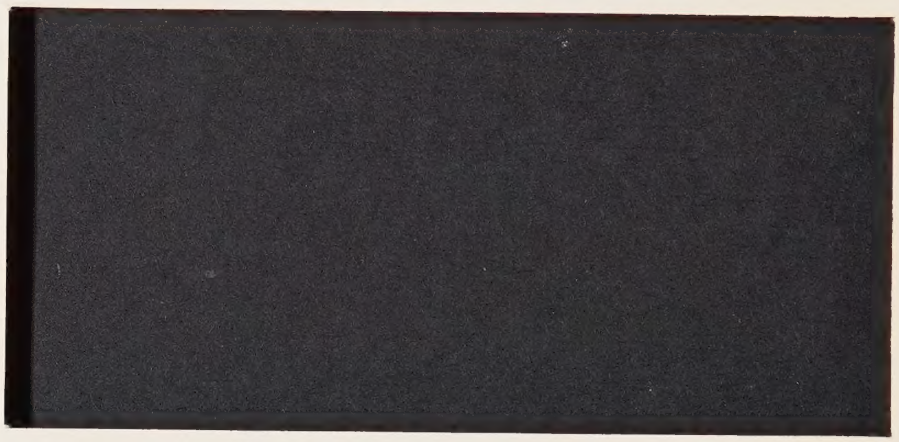
INSTITUTIONAL FACTORS AFFECTING IMPLEMENTATION OF RESOURCE RECOVERY PROJECTS IN THE SAN FRANCISCO BAY AREA

ASSOCIATION
OF BAY AREA
GOVERNMENTS

ABAG



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PREPARED BY

THE ASSOCIATION OF BAY AREA GOVERNMENTS

FOR

THE STATE SOLID WASTE MANAGEMENT BOARD

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INTRODUCTION

For some time it has been recognized that while technological and economic uncertainties associated with large scale waste-to-energy processes can be reduced through research and experience, institutional issues remain a formidable barrier to implementation of these projects. Much of the difficulty lies in the fact that the term "institutional" is so broadly encompassing. The proponents of a project to convert solid wastes to energy must not only take into account a very large number of agencies and organizations--public and private--with varying degrees of authority or influence over the establishment, operation and maintenance of facilities, but also must forge an extraordinarily complex array of legal, financial, environmental and economic relationships and agreements among them, if the proposal is to succeed. No two projects will have the same institutional "set." However, in the steps leading from planning to implementation, there is a core group of agencies and organizations, and formal and informal arrangements among them, that is required for all projects, for both statutory and practical reasons. Project-specific features--location, type of process and product, public or private ownership and operation, etc.--bring additional agencies and requirements into the picture.

This report has been prepared to assist local governments in the San Francisco Bay Area in sorting out the institutional requirements for successful implementation of energy recovery projects. Front end materials recovery and technological and economic feasibility of various waste-to-energy systems, which have been the subject of detailed public agency and private sector analysis, are not covered here.

Much of the material on institutional issues in Chapters I and II is derived from a number of other sources: U.S. Environmental Protection Agency publications; reports from the State Solid Waste Management Board's Bay Area Solid Waste Management Project; information from ABAG's environmental management and economic development planning programs and local revenue studies; and the experiences of Bay Area pioneers in this field--the jurisdictions that have, with assistance from the State Solid Waste Management Board, started on the path toward realizing a waste-to-energy project. While some of it is not new information, this report, for the first time, brings it together in a single document, making it possible to draw conclusions about avoiding pitfalls and overcoming roadblocks.

The report is organized in three parts:

- Chapter I -- brief descriptions of the public agencies at all levels of government, private organizations and interest groups that do, or may in some way, affect the planning and implementation of resource recovery facilities.

- Chapter II -- in-depth examinations of institutional considerations--alternative configurations of agencies and relationships--for: assuring a waste supply, financing,

marketing of fuel products, risk management, permits and other requirements, political accountability and public acceptance.

- Chapter III -- a summary of the principal issues discussed in Chapter II, noting those that are still unresolved.

CHAPTER I.

AGENCIES, ORGANIZATIONS AND INTEREST GROUPS THAT AFFECT ENERGY RECOVERY PROJECT IMPLEMENTATION

The proponents of a waste-to-energy facility must deal with an extraordinary number of agencies and organizations, public and private, that have some authority over, or exert some influence on, the establishment, operation and maintenance of such facilities. The specifics of the project, its location, size, process type, product, etc., will determine what entities both public and private, will need to be consulted and the extent of their involvement.

This chapter contains brief descriptions of the roles and authorities of agencies that will:

1) always be involved in regulating or monitoring these facilities;

2) may have a role due to circumstances or characteristics of a specific project; or

3) may have monitoring or planning responsibilities, or an advocacy role.

Table I-1 summarizes these agencies, their roles and relationships to project initiation, construction and operation. Consult the following text for descriptions of the specific requirements and conditions that invoke each agency's or organization's involvement.

TABLE I-1. SUMMARY OF AGENCIES AND ORGANIZATIONS AFFECTING ENERGY RECOVERY PROJECT IMPLEMENTATION

U.S.	ALWAYS	UNDER SPECIFIC CIRCUMSTANCES
Coast Guard		Regulatory
Corps of Engineers		Regulatory
Environmental Protection Agency	Regulatory	
Fish and Federal Energy Regulatory Commission		Regulatory
Fish and Wildlife Service		Regulatory
California		
Air Resources Board	Regulatory	
Coastal Commission		Regulatory
Pollution Control Financing Authority		Financial Assistance
Office of Planning and Research		Monitoring
Department of Fish and Game		Regulatory
Department of Health Services	Regulatory	
Energy Conservation and Development Commission		Regulatory
Public Utilities Commission		Regulatory
Solid Waste Management Board	Regulatory	
State Lands Commission		Regulatory
Water Resources Control Board	Regulatory	
Bay Area		
Association of Bay Area Governments	Monitoring	
Bay Area Air Quality Management District	Regulatory	
Bay Conservation and Development Commission		Regulatory
Central Regional Coastal Commission		Regulatory
North Central Regional Coastal Commission		Regulatory
Regional Water Quality Control Board	Regulatory	
Local		
County	In unincorporated areas	
Board of Supervisors	Regulatory, Operating	
Planning	Regulatory, Monitoring	
Public Works	Regulatory	
Health	Regulatory	
Enforcement	Regulatory	

	In incorporated areas	
City		
Council	Regulatory, Operating	
Planning	Regulatory	
Public Works	Regulatory, Operating	
Municipal Electric Utility	Operating	
Other		
Municipal/County Franchisees	Operating	
Special Districts		Regulatory, Operating
Pacific Gas and Electric Co.		Customer, Operating
Advisory Groups	Advocacy, Monitoring	
Special Interest Groups	Advocacy	
Community Groups	Advocacy	

A. FEDERAL

1. U.S. Coast Guard

- o Responsible for search and rescue in U.S. navigable waters, for enforcing Federal laws governing navigation, vessel inspection, port safety and security, marine environmental protection and resource conservation. Administers and enforces safety standards for commercial vessels and for security of ports and movement of vessels.

- o Energy recovery facilities may involve transporting solid waste by barge. Such vessels will need to meet the standards administered by the Coast Guard for design, construction, equipment, and maintenance. They will also be subject to rules and regulations for movement of vessels.

2. U.S. CORPS OF ENGINEERS

- o Regulatory responsibility, pursuant to section 404 of the Federal Water Pollution Control Act, to protect navigation channels and harbours against encroachments and to restore and maintain water quality by regulating the discharge of dredged or fill material into coastal and inland waters and wetlands. Jurisdiction includes all waters of U.S. and adjacent wetlands. Permit system authorizing structures and work in or affecting navigable waters, discharges of dredge or fill, and transport of dredged material for dumping. Criteria for judging applications tend to be general. Under section 401 of the FWPCA, the State Water Resources Control Board may issue a separate certification for the same action, using specific standards for protection of water quality.

- o An energy recovery facility located in Corps jurisdiction, or that would discharge dredge material or fill, would require a permit. Approval of permit is based on a determination that the project is in the public interest.

3. U.S. ENVIRONMENTAL PROTECTION AGENCY

- o Regulatory responsibility for controlling air and water pollution, solid wastes, pesticides, drinking water quality, etc. Administers the Federal Water Pollution Control Act, the Clean Air Act and the Resource Conservation and Recovery Act. Establishes and enforces standards, monitors pollution, and assists State and local governments in environmental regulation. Administers federal assistance programs for the development and maintenance of state and local environmental control programs.

Standards for air and water quality protection are set nationwide by EPA. For air quality, standards may vary depending on whether new facilites are in a non-attainment area (such as the San Francisco Bay Area). For water quality, the State may set standards that are more strict than the minimum federal standards. In California, EPA has delegated to the State the authority to regulate water quality standards. However, EPA, in reviewing water quality permit applications, does have veto power if there is reason to believe that Federal standards will not be met.

4. FEDERAL ENERGY REGULATORY COMMISSION

- o Successor to Federal Power Commission. Responsible for licensing hydroelectric power projects; establishing and enforcing interstate wholesale rates and charges for the sale and transmission of electricity and for the non-emergency interconnection of facilities for the generation, transmission and sale of electricity. For natural gas facilities, issues and enforces certificates of public convenience and necessity for construction of facilities, abandonment of services and facilities; regulation.

- o An energy recovery facility would only come under the authority of FERC and require a license from the Commission if interstate sale and transmission of electricity were involved.

5. U.S. FISH AND WILDLIFE SERVICE

- o Responsible for assuring maximum opportunity for people to benefit from fish and wildlife resources as part of their natural environment. Involved in resource management, research, impact assessment, game law enforcement, fisheries, stocking of waters. Has review and comment role for projects concerning fish and wildlife.

- o Energy recovery facilities will not need permits from U.S. Fish and Wildlife Service. However, the Service may review and comment where there are potential impacts on fish and wildlife. They may also suggest mitigation measures. Other agencies, such as the USCOE whose criteria are very general, often take seriously negative comments and conditions that Fish and Wildlife proposes.

B. STATE

1. CALIFORNIA AIR RESOURCES BOARD

- o Responsible for administration, research, development of standards and coordination of air pollution control activities. Designated state agency for implementing federal Clean Air Act. The Board administers the State's program for control of motor vehicle emissions and oversees substate stationary source controls.

- o Energy recovery facilities with air emissions must meet emission standards and limitations necessary for the attainment and maintenance of national ambient air quality standards. ARB is in an overseer role, but may intervene if necessary in regional BAAQD permit process. Refer to section on air quality in Chapter II for more detailed description of air quality standards applicable to facilities in Bay Area.

2. CALIFORNIA COASTAL COMMISSION

- o Responsible for protecting, enhancing, and restoring coastal environmental quality and resources. Regional commissions issue development permits within the "coastal zone" as defined in the Calif. Coastal Act of 1976. The State Commission is responsible for reviewing and certifying local coastal plans (LCPs) and hearing appeals from regional commission decisions. Ultimately, when all LCPs are certified, the regional commissions will be phased out and local governments will be responsible for issuing development permits according to State coastal policies.

- o Any energy recovery facility located within the coastal zone would require a permit from the regional commission, and ultimately from the responsible city or county government. Unless a facility is determined to be coastal dependent, and therefore eligible for a special exemption, it must meet all policies for new development in the coastal zone, including requirements for public access to the ocean, protection of recreation areas, maintenance and enhancement of land and marine resources.

3. CALIFORNIA POLLUTION CONTROL FINANCING AUTHORITY

- o Provides low-cost financing of mandated pollution control facilities for small business; joint program with U.S. Small Business Administration. Its objective is to provide low-cost funding for pollution control facilities. No regulatory authority. Applicant must meet the definition of small business as defined by SBA, based on credit criteria. Any private enterprise which

must comply with air and water quality regulations or has a project for conversion of wastes to raw material is eligible.

A key eligibility factor for CPCFA financing is that the air or water pollution abatement facilities do not generate a material profit to the operator.

4. GOVERNOR'S OFFICE OF PLANNING AND RESEARCH

- o Designated responsibility for comprehensive land use and environmental policy planning. OPR does not have direct implementation or regulatory power. Has broad goals on development and environmental quality (including solid waste). Acts as the state clearinghouse for review by state agencies of state/regional/local federal applications for federal grants and subdivision maps.

- o Energy recovery facilities would be of interest in relation to statewide goals for environmental quality and resources management or OPR might review and comment on proposal for consistency with State policies, but has no direct authority.

5. STATE DEPARTMENT OF FISH AND GAME

- o Responsibility for protection, maintenance, enhancement, and management of fish and game resources of California. The Department has authority to review, comment and recommend action on all projects involving water quality or land management that may have an effect on fish and game resources. No regulatory authority except for harvesting of fish and wildlife and for alteration of a streambed.

- o An energy recovery facility would usually be reviewed by Fish and Game to determine its impact on fish and game resources. In a case where facilities for water supply, sewage disposal or on-site disposal of ash would involve alteration of a streambed, an agreement is worked out between the Department and the applicant with terms and conditions that protect fish and wildlife resources.

6. STATE DEPARTMENT OF HEALTH SERVICES

- o Responsible for regulating the handling, processing and disposal of hazardous wastes. The Department issues permits to solid waste facilities that accept or dispose of hazardous wastes.

- o Any energy recovery facility that accepts or disposes of hazardous wastes (as defined in the California Hazardous Waste Control Act of 1972, Section 25117) would have to

obtain a permit from the Department. Also reviews the designation of local solid waste enforcement agencies and their enforcement programs to implement state solid waste handling and disposal standards (AB2439, sec. 66796.10)

7. STATE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

- o Responsible for State level planning for electric energy needs and for regulating all new thermal electric generation facilities. It administers a certification process based on standards applicable to new generation facilities. It may preempt all other standards by other state agencies and by local governments (except air and water quality standards. Power plants below 50 megawatts are not subject to energy commission certification. Plants below 100 megawatts currently may qualify for an exemption.

- o Energy recovery facilities above 50 MW that generate electricity are subject to certification by the Commission, consistent with State plans and standards. The commission's authority covers both publicly-owned and privately-owned facilities. Facilities that produce fuel but do not generate electricity would not come under commission authority.

8. STATE LANDS COMMISION

- o Responsible for management and supervision of all statutory land which the State has received from the Federal Government. Statutory lands include the beds of all naturally navigable rivers, streams and lakes; tide and submerged lands in the Pacific Ocean which extend from the mean high tide line seaward to the three-mile limit; swamps and overflow lands; vacant school lands; and granted lands. Private or commercial use of these lands must be authorized by SLC through a lease or permit. These uses must conform to trust purposes, i.e., preservation of public right to commerce, navigation, or fisheries on public land.

- o Energy recovery facilities would fall under the SLC's jurisdiction if they are proposed on state land and would require a permit or lease. According to Title 2, Division 3 of the California Government Code in instances where pipelines, conduits, powerlines, outfall lines, sewer lines, utilities, access roads and structures associated with a facility, cross over statutory land, the State Lands commission would also require a right-of-way lease, to run for a specified time period.

9. STATE PUBLIC UTILITIES COMMISSION

- o Regulates the service and rates of certain privately-owned public utilities and transportation companies; publicly-owned utilities are not under its jurisdiction. Licenses the operation of plant, equipment, apparatus or facilities of a public utility; issues a certification of public convenience and necessity for construction of new plant or expansion of an existing facility; reviews and approves power plant sitings.

- o If an energy recovery facility is privately owned and produces electricity for sale, it would be subject to PUC regulation.* A "certification of public convenience and necessity" would be required for expansion or construction of an electricity generating facility.

10. STATE SOLID WASTE MANAGEMENT BOARD

- o Develops and maintains state policy on solid waste management and resource recovery. Adopts and modifies standards governing operation of solid waste management facilities.

- o Following approval of solid waste management facilities, including any energy recovery facilities, by the local enforcement agency, the SSWMB has the responsibility, under AB 2439, to concur with or object to, the issuance, modification, or revision of such permits. Determination is based on compliance with the county solid waste management plans or state policies and standards.

11. STATE WATER RESOURCES CONTROL BOARD

- o Responsible for administering State and Federal standards to regulate discharge of effluent into receiving waters; establishes criteria for waste disposal site classification to protect water quality. The State Board delegates authority for issuing permits under the National Pollution Discharge Elimination System (NPDES) to the regional water quality control boards.

- o Any energy recovery facility that discharges effluent to California waters and/or produces residues for land disposal must meet State and Federal wastewater quality standards. The State has policies on the following which may be relevant to energy facilities: bays and estuaries, thermal waste, industrial pollution control.

*Recent legislation (SB 1805) amending the Public Utilities Code, exempted from PUC certification requirements a private corporation employing cogeneration technology for generating electricity for its own use or use of its tenants, or for sale to an electrical corporation, a state or local public agency.

C. SAN FRANCISCO BAY AREA

1. ASSOCIATION OF BAY AREA GOVERNMENTS

- Comprehensive planning agency for nine-county Bay Area. Plans and programs include work in solid waste management, air and water quality, and assessment of impacts of energy facilities. As regional A-95 clearinghouse for federal grant-in-aid assistance to local agencies, reviews local plans and projects to identify regional concerns and multi-jurisdictional impacts of environmental, institutional, social and economic nature. ABAG derives authority for regional solid waste planning from SB 424 (1977), and from State Solid Waste Management Board designation under federal Resource Conservation and Recovery Act of 1976; plan and project review authority for federal grant applications from Office of Management and Budget Circular A-95; review and comment on county solid waste management plans for consistency with regional planning is required by SB 5 (1972).

  The regional solid waste management plan of the integrated Environmental Management Plan for the Bay Area includes responsibility for review of resource recovery projects of regional significance.

- Energy recovery facilities will be reviewed by ABAG for consistency with regional solid waste management objectives and with other environmental and economic goals and policies. Projects funded through federal programs covered under Circular A-95 would receive formal review; recommendations for approval, conditions, or denial would be made to the federal funding agency.

2. BAY AREA AIR QUALITY MANAGEMENT DISTRICT

- Responsible for regulating stationary source emissions in seven counties of Bay Area and portions of Solano and Sonoma Counties. BAAQMD develops regulations and administers a permit system. Has adopted stationary source control standards for air pollutants. Decisions subject to review by ARB and EPA, and could be overturned by them.

- Any energy recovery facility with air emissions must obtain a permit to construct and a permit to operate. Issuance of permits would be based on determination that proposed new source would not create a significant quantity of air contaminant which would interfere with attainment or maintenance of air quality standards of ARB or EPA, or would violate an emission standard adopted by BAAQMD. (See page II. E-4 for details of air quality regulations.)

3. SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

- o Responsible for regulating all filling, changes in existing uses, and dredging in San Francisco Bay. This includes jurisdiction over a 100 foot wide shoreline band and certain diked areas and managed wetlands. Permit authority for all development activities in its jurisdiction.

- o Any energy recovery facility, or part thereof, proposed within BCDC's 100 foot shoreline band must obtain a permit. Criteria for determination include maximum feasible public access to the Bay or conformance with water-related uses specified in the Bay Plan. BCDC is concerned that the water quality of the Bay is maintained but leaves regulation to other agencies.

4. CENTRAL AND NORTH CENTRAL REGIONAL COASTAL COMMISSIONS

- o Issue development permits within the "coastal zone" as defined in the California Coastal Act of 1976. Ultimately, when all Local Coastal Plans have been certified by the State Coastal Commission, the regional commissions will be phased out and local governments will be responsible for issuing development permits according to coastal policies.

- o Any energy recovery facility located within the coastal zone would require a permit from the appropriate regional commission. Unless a facility is determined to be coastal dependent, and therefore eligible for a special exemption, it must meet all policies for new development in the coastal zone, including requirements for public access to the ocean, protection of recreation areas, maintenance and enhancement of land and marine resources.

5. SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD

- o Responsible for monitoring all projects discharging into receiving or navigable waters or those projects that may affect groundwater supplies within nine Bay Area Counties. Issues NPDES permits; adopts waste discharge requirements for land disposal of residues.

- o Energy recovery facilities that have point source discharges of wastewater and/or residues requiring land disposal must receive appropriate authorization from the RWQCB. Point source discharges must meet State and Federal standards; NPDES permits will be reviewed by EPA.

D. LOCAL GENERAL PURPOSE GOVERNMENTS

Within their jurisdictions, authorized by state to carry out a broad range of responsibilities, including planning for future development, providing and maintaining streets and parks, providing social services, regulating development activity and changes in land use. Responsibilities of cities and counties and their various departments are described below.

1. COUNTY

a) Board of Supervisors

- Final authority in all land use decisions in unincorporated areas. Composed of locally elected officials; advised by various commissions and departments. In solid waste management, the Board is responsible for preparing, in cooperation with affected local jurisdictions, a comprehensive, coordinated county solid waste management plan consistent with state policy and consistent with any appropriate regional or subregional solid waste management plan. Board may acquire, construct, contract, alter, enlarge, maintain dump sites and disposal plants; it may collect or establish a schedule of fees to finance services provided.

- An energy recovery facility located on unincorporated county land would be subject to county regulations. The applicant must receive authorizations or permits from the following county departments before construction and operation can occur. Departments will judge a project based on the county solid waste plan but also on a range of other local objectives.

b) County Planning Department

- Acts in advisory role to county planning commission and county board of supervisors on matters relating to development and maintenance of the general plan, specific plans, and local capital improvement programs. Administers local land use controls such as zoning ordinances and other regulations through a permit process. May have significant responsibilities in solid waste management planning. In Alameda, Santa Clara, and Solano counties the planning department has primary responsibility for solid waste management planning. Responsibilities include determining conformance of proposed energy facilities with the county solid waste management plan, suggesting amendments, or updating the plan.

- All energy recovery facilities in unincorporated areas must obtain approval from the county planning

commission and/or the board of supervisors through the permit process administered by the planning department. A wide range of local policies will be used to determine the consistency of the project with local objectives to promote the general welfare. Variances to or changes in local zoning would also be handled by the planning department.

c) County Department of Public Works

- o Responsible for building and safety standards for new facilities in unincorporated areas. May also have significant responsibilities for solid waste management planning. In Contra Costa, Marin, Napa, San Francisco, San Mateo, and Sonoma counties, the department of public works prepared the county solid waste management plan, and now determines conformance of new facilities with the plan.

- o An energy recovery facility would require construction permits from the Public Works Department that would ensure consistency with local building and safety ordinances. In the above mentioned counties, public works would also review for consistency with the county solid waste management plan.

d) County Health Department

- o Responsible for public health and sanitation problems, as well as vector control. Enforces State minimum standards for the handling and disposal of solid wastes in unincorporated portions of the county. Many perform this function in cities through contract. Also enforces provisions of County's disposal site permits. (Generally, the County Health Department has been designated as the local enforcement agency [see below] for enforcement of solid waste standards and administration of state mandated solid waste facilities permits. In some counties, cities have chosen to perform the local enforcement function within their jurisdiction.)

- o An energy recovery facility would be subject to Health Department inspection and enforcement of State and local standards related to storage, handling and disposal of solid waste.

e) County Enforcement Agency

- o Pursuant to regulations in Division 7 of Title 14 of California Administrative Code, Chapter 5, a local agency must be designated by the county board of supervisors, by a joint powers agreement of the cities and the county, or by each city and county individually

to enforce the standards of the county solid waste management plan. Generally, the designated agency is the county public health or public works department. In some cases, a city acts as enforcement agency for incorporated areas. Therefore, it is not a new or separate agency, but an existing one that has an additional set of responsibilities. In any case, the local enforcement agency may not be an agency that operates solid waste handling or disposal facilities. It administers a permit and inspection program for all solid waste handling and disposal facilities in the county.

- o An energy recovery facility must obtain a solid waste facility permit to operate from the designated enforcement agency within whose jurisdiction the site lies. The facility must be consistent with the county solid waste management plan and the state standards adopted by the SSWMB for storage, handling and disposal of solid wastes.

2. CITY

a) City Council

- o Decision-making authority on all matters within its jurisdiction. Composed of local elected officials, advised by commissions and functional departments. Authorized by State to prepare a general plan and to implement the plan in exercise of its state-delegated police power. Responsible for enforcing State and Federal minimum standards for handling and disposal of solid wastes within city boundaries. Municipal ordinances govern storage, collection, disposal of solid waste, acquisition of disposal sites. Responsible for land use zoning and planning approval and licensing of all solid waste processing and disposal facilities, designating service areas and franchised territory, and regulating charges and fees within city boundaries. Various city departments administer these functions (see descriptions below).

- o Any energy recovery facility located within an incorporated area would require approval of the city council. Determination would be based on consistency with solid waste criteria as well as a range of local objectives.

3) CITY PLANNING DEPARTMENT

- o In cities with planning departments, the department is responsible for administration of local zoning ordinances including the issuance of land use permits.

- o Any energy recovery facility within a city would require a city land use permit.

4. CITY DEPARTMENT OF PUBLIC WORKS

- o Responsible for enforcement of municipal building, plumbing, safety codes. Issues building permits and inspects new structures for compliance.

- o Energy recovery facility would have to comply with building codes and would require permits from Public Works prior to operation.

5. MUNICIPAL ELECTRIC UTILITY

- o A city may generate, transmit, distribute, and sell electricity to its residents and to industries. This service would be under the authority of the city council as are other services. The utility may also purchase electricity elsewhere for distribution and sale within the city. It is not regulated by the State PUC, but would be regulated by the FERC if interstate wholesale sale of power is involved.

- o A municipal electric utility could be the developer of an energy recovery facility or could be a customer of power generated from such a facility. For example, the City of Alameda is proposing to construct and operate an energy recovery facility to supplement the electricity its Bureau of Electricity purchases from PG&E.

E. OTHER

1. MUNICIPAL OR COUNTY SOLID WASTE FRANCHISEE

- o Usually a private company that executes a franchise agreement with a city, county or special district. The franchise grants the company rights for pick-up of wastes in specified areas, for specified clients (that is, residential, commercial, etc.). Franchises are often long-term and exclusive. Landfills are also often privately owned and operated. While many Bay Area jurisdictions own and/or operate disposal sites, only three cities--Berkeley, Dixon and San Leandro--provide collection services.

- o An energy recovery facility would be dependent upon scavengers or generators of organic wastes for a consistent fuel supply. Types of wastes include municipal solid wastes and sewage sludge, wood wastes, agricultural wastes. Formal agreements with waste generators, collectors and disposers would be essential to assure a stable, adequate, long-term supply. Collection and disposal companies could be involved in an energy recovery system as fuel supplier, as the private developer of such a facility, or as a partner in a public/private joint venture for financing and operation.

2. SPECIAL DISTRICTS

- o Defined by the State Controller's Office as "a legally constituted governmental entity, which is neither city or county, established for the purpose of carrying on specific activities within clearly defined boundaries." Several types of special districts have the authority to become involved in some aspect of solid waste management: local health districts, garbage disposal districts, county service areas, community services districts, county water districts, municipal utility districts, public utility districts. California law enables these districts to conduct such activities as constructing and operating disposal facilities and sites, collecting garbage, operating a system for transfer of solid waste, providing treatment facilities for garbage. In addition, some types of districts may set and enforce regulations relating to refuse collection and disposal in the district. There are also several types of special districts that have the authority to engage in electric utility operations. Examples of these are public utility districts, municipal utility districts, irrigation districts. They may produce, transmit, distribute, or sell electricity. Often districts do not use all of the powers for which they are authorized. The East Bay Municipal Utility District, which sells electricity, is the only special district that exercises this option.

- o Energy recovery facilities located within the jurisdiction of special districts providing garbage service may be subject to their regulation. These districts could also be the developers

of such a facility. Agreements may be necessary to ensure a sufficient supply of organic wastes and to dispose of residue.

3. PACIFIC GAS AND ELECTRIC COMPANY

- Private investor-owned utility that generates and distributes power to most of Bay Area. PG&E generates power, transmits and distributes gas and electricity for over 5.6 million customers. Operates hydroelectric plant, thermal-electric plants, and a geothermal plant. Buys electricity from other sources. Regulated by PUC.

- PG&E could have several roles in implementation of a waste-to-energy facility: potential customer for power; developer and operator of a facility; or back-up supplier of electricity for a waste-to-energy facility.

4. ADVISORY GROUPS

- Local and public regional agencies frequently have advisory committees that suggest approaches, review agency activities, or supply technical expertise. Advisory groups may be composed of staff from other concerned agencies, representatives from private industry, technical experts, advocates from special interest groups, and concerned citizens. They serve as a valuable forum to discuss new ideas or specific projects. During the development of the county solid waste management plan, all counties set up advisory committees for technical and public input. Another example is the Solid Waste Advisory Committee to ABAG's Environmental Management Planning Program.

5. SPECIAL INTEREST GROUPS

- Solid waste management activities have captured the attention of special interest groups when their particular concerns were affected. For example, established environmental groups have become active as particular resources or geographical areas were affected by solid waste projects or plans. Examples are the Solid Waste Task Force of the Sierra Club, the Save the Bay Association, Political Action to Conserve the Environment (PACE), and Association of Bay Area Recycling Groups and Environmentalists (ABARGE).

  Other organizations, notably the League of Women Voters, undertake studies to develop positions and increase public awareness on a broad range of issues. The Bay Area Council serves the business community in a similar fashion. Trade organizations represent industry interests, e.g., California Refuse Removal Council, Northern Section, and the Clara-Mateo Garbagement's Association.

- All of these groups have particular objectives that may be affected by proposed energy recovery facilities and can be expected to express their concerns and advocate their interests

when decisions about energy facilities are being made.

6. COMMUNITY GROUPS

- The location chosen for a resource recovery facility will frequently be of concern to groups representing communities, minorities, neighborhoods and homeowners. If such a facility is perceived as a nuisance or a detractor of community values, representatives of affected areas are highly likely to be opposed. In some cases, low-income people could be disproportionately affected. Citizens committees may push for alternative locations or for adequate mitigation of potentially adverse impacts.

CHAPTER II.

ARRANGEMENTS FOR PROJECT IMPLEMENTATION

While the institutional issues that excite the most publicity and attention in the waste-to-energy project implementation process are approvals by numerous permit issuing bodies and public acceptance, and these approvals must be kept in mind from the very beginning, project planners must resolve a substantial number of other institutional issues long before a site is chosen and the permit and public approval process begins. In the conceptual and feasibility study stages, interaction, formal agreements and contracts must be established among various agencies and organizations involved in (1) securing marketing agreements for energy products; (2) selecting the type of process and size of facility; (3) ensuring an adequate waste supply and adequate disposal of residues; (4) assigning public and private responsibility for project financing and management; and (5) risk management.

In this chapter, these issues are examined, starting with project conception and continuing through final approval. For each step in the planning process, the factors, choices, agencies and relationships that should be considered are presented.

A. ARRANGEMENTS FOR MARKETING OF PRODUCTS*

The decision to undertake a waste-to-energy project often arises when a jurisdiction is running out of landfill capacity and no convenient alternative is available. Usually, only when wastes must be hauled at considerable expense to distant landfills does an energy recovery facility become economically competitive, though this situation is changing as oil and gas supplies are curtailed and prices rise dramatically.

When a jurisdiction decides to convert its wastes to energy instead of finding a new landfill site, its first step should be to survey market outlets for its products. Energy recovery projects can generate a variety of products from solid wastes: solid, liquid and gaseous fuels are possible, as well as steam and electricity. The product and the potential user must be known before the type, capacity, and, sometimes, location of the facility can be determined.

Possible marketing arrangements for fuels, steam and electricity are discussed below. It should be noted that this is a general discussion. Some technologies and conditions may not be applicable to the Bay Area.

1. MARKETING ARRANGEMENTS FOR FUELS

Fuels can be produced from solid waste using a number of technologies. Either heavy duty shredders, or pulpers, operating in conjunction with material classifiers, can produce solid fuels, while pyrolysis reactors can produce liquid and gaseous fuels. These fuels may be burned in furnaces either by themselves or in conjunction with their fossil fuel counterparts: coal, petroleum, and natural gas. In addition, waste-derived fuels can be used for the production of steam and electricity. The usefulness or marketability of these waste-derived fuels depends on their characteristics.

a) Fuel Characteristics

Fuels derived from municipal solid waste will have physical and chemical properties different from those of conventional fuels and, therefore, will have different handling and combustion characteristics.

There are a number of general characteristics that determine the marketability of fuels derived from solid waste whether they are solid, liquid, or gaseous. These include the following:

*Sections 1 and 2 on marketing arrangements for fuels, steam, and electricity are excerpted and adapted from Resource Recovery Plant Implementation: Guides for Municipal Officials, Markets. U.S. Environmental Protection Agency, 1976.

(i) Quantity of fuel produced

Enough of the product must be available to justify any expenses that the user may incur in modifying his facility to accept this new fuel source. Naturally, the higher the cost of plant modification, the greater the minimum quantity of fuel will be required. This reduces the alternatives available to communities of 50,000 people or less. These communities may want to investigate using small incinerators with heat recovery systems.

(ii) Heat value

The heat value of each fuel must be high enough to maintain boiler or furnace efficiency. For example, tests using gaseous fuels with heat values of 300 British Thermal Units (Btu)/cu.ft. and above have been successful. Below this level, they may require special consideration, although some types of industrial operations have used gaseous fuels with heat values as low as 90 to 100 Btu/cu.ft. Also, the lower the heat value, the higher the per unit cost to transport, store, and handle the greater quantity of fuels required.

(iii) Supply reliability

An adequate and continuing supply of the fuel increases its value because the user does not need to maintain standby equipment or fuel.

(iv) Quality

The better the product, in terms of handling, stability, uniformity, good burnout, greater Btu value, etc., the more it is worth because the customer's cost to use the product is reduced.

(v) Price

The price of the fuel will probably be approximately equivalent (on the basis of heat value produced) to the price of the fossil fuel it replaces. In determining equivalence, adjustments must be made for additional costs incurred in its use.

b) Solid, liquid, and gaseous fuels

(i) Solid fuel

Solid waste fuels are produced by separating the light combustible fraction of shredded or pulped solid waste from the heavier noncombustible portion. The light fraction will probably represent 70 to 80 percent of the incoming solid waste, and may be the primary contributor of product revenue.

Refuse derived solid fuels can be used as a supplement to coal in suspension-fired utility boilers. They are also being considered for use in conjunction with oil-fired units as a fuel supplement in cement kilns. These fuels can be prepared as a fine powder, light fluff, dewatered wet pulp, or as a densified pellet or cubbette. Heat values are typically 4500 to 6500 Btu per lb (as received) and the fuel may have value of $.30 to $2.00 per million Btu depending on the quality of the product, the user's expected handling costs, and the availability of alternative fuels. Some factors that influence the marketability of these solid fuels are:

Particle size. Ideally, particles must be small enough to permit complete combustion when burned in suspension. However, practical size ranges vary with the type of unit used to burn the fuel. A general rule of thumb has been a one-inch nominal (90 percent less than one inch) particle size. Small particle size is particularly important if there are no burnout grates at the base of the combustion chamber.

Residue content. Residue should be kept to a minimum in order to prevent erosion of the furnace walls and the fuel firing system. Excessive residue may restrict the re-sale value of the coal ash. Air classifiers and magnetic separators can be used to remove noncombustible materials to reduce the ash content of the combustible fraction of the fuel. Typically, ash content amounts to about 20 percent by weight. This can cause a five fold increase in ash per unit of heat delivered, since better grades of coal average about 10 percent ash and have heating values two and one-half times that of the refuse derived fuel.

Moisture content. Moisture content will affect the heat value of the fuel. The combustion efficiency of the unit is reduced as the moisture content is increased. This is particularly important in preparing fuel by the wet pulping method because the fuel product must be dewatered to an acceptable moisture content. Dry separation processes generally produce a fuel containing 25 to 30 percent moisture content and having a 4500 to 6500 Btu/lb. heat value. The wet pulping method produces a fuel containing 50 percent moisture and has a 3500 Btu/lb. heat value.

Solid fuels may also be formed into pellets in order to improve the fuel's handling characteristics. Also, by forming pellets this fuel may be made suitable for use in older stoker-fired units which would not be able to use a finely divided fuel. The use of pellets, however, has not yet been demonstrated on a large scale.

(ii) Liquid fuel

One energy recovery technology under development in San Diego, California, produces a heavy, oil-like liquid fuel that can be used as a supplement to No. 6 fuel oil in large industrial or utility boilers. Factors which will influence its marketability include the following.

Volumetric heating value. The volumetric heat value (Btu per gallon) influences the cost of transporting and storing the fuel. The fuel has about 75 percent of the heat value of No. 6 fuel oil, on a volumetric basis.

Chemical stability. If the fuel undergoes chemical change, storage time may be restricted.

Special handling problems. The need to maintain separate storage and firing systems for the solid waste fuel, and to purge the firing systems after the fuel has burned, places an extra burden on the user and may diminish the fuel's value.

(iii) Gaseous fuel

Most gaseous fuels produced from solid waste have a low heating value (100-500 Btu per cu ft) as compared to natural gas (1000 Btu/cu ft) because they contain significant quantities of carbon dioxide and, in some systems, nitrogen. The

distance they can be transported is limited due to cost of compressing and pumping the gas during transit. As the fuel value goes down this cost becomes prohibitive. Distances beyond 2 to 3 miles may be uneconomical for transporting gases having heat values of 300 per cu ft or less. Such fuels would probably have to be converted to steam or electricity on site where they are produced.

c) Markets for fuels

The best markets for solid waste fuels would be large utility or industrial users who could replace 20 to 30 percent or more of their conventional fuels with solid waste fuel.

Steam electric power plants, industrial operations, and central heating/cooling plants represent the most likely market outlets for solid waste fuels.

(i) Steam electric power plants

Electric utilities operating steam-electric plants fired by fossil fuels are the most promising market because they use very large quantities of fuel and are often located close to the urban area where the solid waste is generated. Also, the quasi-public structure of the electric utility tends to be more conscious of community problems and, in some cases, more receptive to accepting the present uncertainties associated with using these fuels. For instance, a utility may gain approval of a new power plant site more easily if it is a part of a solid waste energy recovery program.

Economic gain is a minor factor influencing a utility to use solid waste fuels because savings, if any, would amount to only a small fraction of the utility's total fuel costs and because savings in the cost of a solid waste fuel are generally passed on to the utility's customers through an automatic fuel price adjustment clause. However, economic gain in the form of capital investment savings and generating capacity credits can be considerable and may result when the utility agrees to purchase steam and/or electric energy.

Solid fuel can be burned only in boilers equipped to handle the residue. To date burning has occurred only on a demonstration basis and only in plants that were initially designed to burn coal. Oil fired plants may not have suitable ash handling capability or air pollution control

facilities suitable for handling burning of solid fuel. Waste burning in such plants has not been demonstrated. Recent orders from the Federal Energy Administration require many oil and gas fueled units that are capable of burning coal to convert to coal. This tends to expand market opportunities for waste firing.

In establishing a solid waste fuel market with an electric utility it is necessary to determine whether the market will be capable of using the fuel for the entire projected useful life of the waste processing plant. This is because as plants become older they are replaced by more efficient newer plants, and their load factors (the amount of use they receive) tend to decline.

The capacity of a power plant to handle solid waste fuel will be a function of its load factor as well as the percentage of solid waste fuel that can be handled safely without damaging the plant or otherwise affecting its operation. For example, a 200 megawatt boiler having a load factor of 60 percent and a heat rate of 11,200 Btu/kwhr retrofitted to burn 10 percent solid waste derived fuel could handle about 500 tons of solid waste per day.

Utilities project load factors for all of their units using a set of assumptions such as future price of fossil fuels, customer demand, planned nuclear construction, projected environmental constraints, etc. These projections are understandably subject to a great deal of uncertainty. If, however, a utility company projects that the economic utilization of the facility which will burn solid waste is going to decline then it may mean that the price the utility will pay for the fuel will decline sharply, or that the market might disappear completely.

(ii) Industrial operations

Many industrial operations are potential markets for fuel produced from solid waste. Cement plants, paper mills, steel mills, and lime plants, for instance, use vast amounts of fuel. To date most of these industrial markets have not been investigated in detail and there is virtually no experience in their burning of municipal waste derived fuel.

Feasibility studies are currently examining the possibility of using solid waste as a fuel in cement manufacturing kilns and a demonstration project is planned in Palmer Township, Pennsylvania, in 1977. The solid waste would supplement the coal or other fuel being used, and any ash remaining would be incorporated into the final cement product. Research is needed on any adverse impacts on cement quality that may result from the use of a waste derived fuel.

Cement kilns require about 8 million Btu of fuel per ton of cement produced. Plants range in capacity from 1,000 to over 3,000 tons or more cement per day. Therefore, using solid waste as 20 percent of the fuel load, a small plant could consume the fuel produced from 400 tons of solid waste per day.

A typical paperboard mill using about 25,000 pounds of steam per ton of boxboard at the rate of 360 tons of boxboard per day would require 400,000 pounds of steam per hour. This is equivalent to an energy yield of 1,200 tons of solid waste per day based on 20 percent solid waste fuel input.

Most paper mills currently burn their own bark and wood waste in boilers to supplement conventional fuels. Although this reduces the capacity of this market for solid waste fuels, it should ease the marketing task because the industry is already accustomed to burning waste fuels.

d) Market value

Current fossil fuel prices generally range from around $.30 per million Btu on older long term coal or natural gas contracts to $2.00 per million Btu for spot purchases of low sulfur coal or oil. The value of the solid waste fuel will be a function of the cost of the fuel it is replacing and the increased costs associated with the use of the fuel.

Because of the wide range in prices being paid for fossil fuel it is wise to examine all potential fuel markets before selecting a particular process or end user.

2. MARKETING ARRANGEMENTS FOR STEAM AND ELECTRICITY

Steam can be converted to other forms of energy: (1) its heat can be used directly, for example, to heat buildings in a district heating system; (2) it can be converted mechanically into electricity by the use of steam turbines, which is what happens in a steam-electric power plant; or (3) for steam to provide motive

force for industrial operations, such as to drive machinery or to operate a compressing unit to produce chilled water in a district cooling system. Factors affecting institutional arrangements include:

a) Steam characteristics

Steam temperature requirements generally range from 250 F to 1,050 F with pressures ranging from 150 pounds per square inch (psi) to 3,500 psi. The strength of the materials used to construct the steam-generating system is dictated by the temperature and pressure. In electric power plants the greatest efficiency is achieved at the highest temperatures and pressures. In steam distribution systems, however, temperatures are kept as low as possible to minimize heat loss in the delivery system and to minimize the possibility of bursting pipes.

In systems that use solid waste as the sole or primary fuel, the steam is usually produced at 600 psi or less in order to minimize slagging and corrosion of the boiler tubes. The steam can be processed further in separate units to bring it to the temperature and pressure at which it is needed.

b) Market considerations

Steam can be marketed in two ways: as a guaranteed supply, or as a limited supply that requires the user to have a backup system. In the first case, the producer (a municipality, private company, or public authority) provides a reliable supply and assumes the responsibility of providing steam from other sources (e.g., a fossil fuel package boiler) if there is an interruption in the production of steam using solid waste. In the second case, the customer buys all of the steam the producer can generate using solid waste, but the customer carries the burden of producing additional steam in the event that this supply is interrupted or is not adequate to meet its demand. In this case, the steam's value to the customer is lower, but the steam producer assumes less risk and responsibility.

To be marketable, steam must meet the specific needs of the user. Some factors that affect steam marketability are:

Proximity to Customer. The steam-generating facility must be close enough to serve the steam market economically. Steam can be transported economically only about 2 miles; and in congested areas pipeline installation can be expensive and other problems may further restrict this distance.

Value. The price at which the steam is delivered must be competitive with the costs of the customers' alternate energy sources.

Availability of Solid Waste. The municipality must insure that it has enough waste to meet its steam output commitments.

Quantity. The amount of steam supplied must be compatible with the customer's needs. If peak loadings cannot be supplied entirely by burning solid waste, then standby, fossil-fuel-fired boilers will be needed.

Operating Schedule. The steam-producing facility must be set up on an operating basis that satisfies the operating schedule of the steam customer.

Reliability. The system must include sufficient backup facilities to meet the level of reliability of supply agreed upon. This may include contingency plans to burn fossil fuels when the solid waste unit is out of service or when strikes or weather prevent solid waste from reaching the plant. The cost of building and operating these facilities must be considered in the economic evaluation of the system.

Excess Steam. The facility must be designed to serve the community's disposal needs, even if there is an interruption to the steam market. Condensing units or a backup sanitary landfill may be necessary.

Timing. The steam must be available when it is needed. Unanticipated delays in construction of the facility could force a steam customer to find another source of steam.

c) Markets for steam

Most metropolitan areas have one or more major outlets for steam. Yet, despite the fact that proven technology exists for generating steam from municipal solid waste, constraints on its use have made the marketing of steam difficult in some cases. Several of these are discussed below.

(i) District heating and cooling systems

There are about 450 commercial and campus district steam heating systems operating in this country, a number of which also distribute chilled water for cooling buildings during warm weather. A number of cities have large steam systems serving their central business or industrial areas.

In these systems, steam is distributed at a low pressure, generally about 250 psi, which can be provided easily by a solid waste disposal facility. Unlike the demand for electricity, which has certain peak periods, steam demand is generally more constant throughout the day and

from day to day. Seasonal variations can be significant, but if the utility also distributes chilled water it can operate its chilling plant with a steam-driven turbine. In any event, the demand for steam can be sufficient to accommodate a constant amount of steam produced in an energy recovery plant during most, if not all, of the year.

Seasonal variations in energy demand can also be balanced by contracting separately for steam and chilled water. For example, in an area where peak demand occurs in the summer, a utility can serve a greater number of winter (steam) customers than summer (chilled water) customers. Also, customers with their own backup systems (such as existing buildings which were later tied into the pipeline) can be put on an interruptable contract to help balance loads.

Because steam usually cannot be transported economically for more than about 2 miles, the solid waste plant must be located close to the steam users; usually this will mean in or near the central part of the city. Although land costs may be higher, solid waste hauling costs will probably be reduced, because of the proximity of the plant to the waste generators.

In a city where no steam distribution network exists, the municipality can consider installing a complete solid waste steam-generating incinerator and a steam distribution network. To minimize the costs, this might be tied to a major urban renewal project or to the construction of a large industrial park. Although the municipality might then be able to sell the steam at a much higher price, it would also be responsible for a much higher capital investment because, being the only source of supply for its customers, it would also have to assume the responsibility for total reliability. A backup system (which might add 10 to 20 percent to the total system costs) would be needed to provide steam when the steam generator was out of service or if there were an interruption in the delivery of refuse to the facility.

Two new systems which are still undergoing modifications to improve their operations will soon produce steam for utility distribution. One is in Baltimore, Maryland and the other is in Nashville, Tennessee. Numerous European cities

produce steam from refuse incineration for utility distribution.

(ii) Industrial plants

Large industrial facilities such as paper mills, food processors, and major manufacturing plants, or industrial facilities that operate 24 hours a day, 7 days a week are preferred customers because a steam-generating (waterwall) incinerator is designed for round-the-clock operation. Some industrial users may specify the quantities of steam to be delivered at specific times, and all will most likely specify the temperature and pressure. These factors must be identified and incorporated in the design of the system.

Many cities have single industries large enough to utilize all the steam that a large solid waste facility can produce. In Saugus, Massachusetts, a waterwall incinerator has been built that handles 1,200 tons of solid waste per day. All of the steam produced in this plant (about 350,000 pounds per hour) is used in the adjacent General Electric Company plan for heating and cooling, electric power generation and a variety of manufacturing and testing operations.

(iii) Steam electric power plants

Although steam electric power plants use tremendous quantities of steam, it may be difficult to develop satisfactory marketing arrangements in this sector.

One problem is that the cost of accommodating an outside steam source may exceed the value of the expected fuel savings. Modification of the pressurized components of the power plant could be prohibitively expensive and could require that the power plant be kept out of service for a long time. Also using supplementary steam may cause a boiler to operate at a lower efficiency so that additional fuel will be needed to obtain the same energy output.

Another marketing problem results from the fact that the amount of electricity that a utility must produce varies considerably throughout the day from day to day. The utility's most efficient plants are used continuously to supply the base load demand, while the less efficient or otherwise more costly plants are only used during peak

demand periods. The utility would be able to buy steam only when the boiler that has been modified to accept outside steam is operating. Generally, base load units operate 75 percent or more of the year, while peak load units operate about 25 percent or less. The base load plants which would make the better market are the ones that the utility is least likely to subject to a disruption in service required by a retrofit.

An alternative to retrofitting an existing unit would be to build a new baseload turbine-and-generator unit especially to take steam produced in the solid waste facility. The Florida Power and Light Company suggested such an agreement to the Dade County Government as part of a plan to buy energy from a proposed solid waste processing facility. According to their proposal, the company building the solid waste facility would also build the generating facility. Florida Power and Light would then buy the steam and the generating facility, paying for the latter on the basis of the units of electricity produced. This arrangement requires that the municipality provide the capital investment; and the municipality, rather than the utility, assumes the financial risk because reimbursement is conditional on successful operation. The value of the steam in this situation is then adjusted to a price equivalent to the utility's "average" generating costs. In the case of the Dade County - Florida Power and Light arrangement, an equation will be used to calculate this value.

d) Markets for Electricity

Electricity produced from solid waste is identical to electricity produced by any conventional method. The problem in marketing electricity though, is that it usually can be sold only to the electric utility serving the area, because within that service area the utility is generally exempt from competition. However, where the electric utility is municipally owned (10 percent of the nation's generating capacity), the city is already in the retail electric sales business and thus, may sell this new supply of electricity to anyone.

The price that a utility will pay for electricity depends on whether it is used to satisfy baseload or peakload demand. Peakload marketing commands a much higher price (perhaps three to five times the price of baseload electricity), however, a municipality needs to sell electricity on a continuous basis (i.e., as baseload) in order to maintain a continuous solid

waste disposal operation.

A municipality considering the sale of electricity to a utility should seek to establish a floating price for the electricity, whereby the price per kilowatt-hour rises as the demand on the utility increases. Thus, the price would be a function of the incremental direct costs the utility incurs in producing the electricity needed to meet increased demand. Another approach would be to sell the electricity to the utility at a price equal to its average cost of production.

3. MARKET PROSPECTS FOR SOLID FUELS AND STEAM IN THE BAY AREA

a) Bay Area Markets for Solid Fuel

Recently, a Bay Area Market survey was conducted by Elrick and Lavidge, Inc. for the State Solid Waste Management Board.* The survey was intended to be a preliminary evaluation of the potential use of the refuse solid fuels by larger manufacturing plants located in Alameda, Contra Costa, San Francisco, San Mateo, and Santa Clara Counties.

The primary means of data collection was through a mail survey questionnaire. The sample was developed from Marketing Economics Key Plants - 1975-1976. Systematic sampling procedures were used to select 180 manufacturing plants having 200 or more employees. A survey report was published in December 1977, based on relatively complete questionnaires from 84 manufacturing plants. Key survey findings are summarized:

- o Over half of the plants indicates some degree of future interest in the waste material fuel as described in the survey.

- o The most frequently mentioned reasons for having some future interest in the waste material fuel included references to:

  - Curiosity or the future need to investigate this alternative fuel source.

  - Potential economic benefits (as described in this survey, the material would be provided free to the plants).

  - An implication that such material may be adequate because the plant has small needs for energy.

*California State Solid Waste Management Board, Report Digests of Four Marketplace Studies Concerning: Aluminum Beverage Cans, Combustible Waste Fuel, Hydrogen, and Piped-in Steam, April, 1978.

- Uncertainty about future supplies of alternative fuels.

- Interest in recycling materials to improve the environment.

o Among the more frequently mentioned reasons for not being interested in using the waste material fuel are:

- The cost of equipment to burn solid fuel.

- The small energy needs of the plant (with the implication that fuel is a minor concern of the plant).

- The uncertainties or unknowns about the availability of the solid fuel (even though they were told it would be available in guaranteed quantities on a guaranteed consistent delivery schedule).

- Pollution or other regulatory limitations.

- Opinions that it would not be an adequate fuel for particular manufacturing processes (such as inadequate to melt steel, not clean enough for certain other processes, etc.).

o The vast majority of the surveyed plants believe there will be enough natural gas or oil available in about five years from now; but some feel the cost may be so high as to prohibit buying it.

o None of the surveyed plants burned any solid fuel within the past 12 months; and virtually none of them have any burners capable of burning any solid fuels.

o Most of the surveyed plants believe that conversion of their current burners to handle solid fuel would be more costly than complete replacement with solid fuel equipment.

o Less than 10 percent of the surveyed plants have any incineration equipment to dispose of combustible waste.

o A substantial minority of the plants expect that they will need to burn some type of solid fuel in order to meet their energy needs; and many of this minority believe it will be necessary within the next 10 years. Included in the most frequently mentioned reasons for expecting to burn solid fuel are:

- Expectations of rising cost of alternative fuels.

- Government requirements to use solid fuel.

- Inadequate supplies of alternative fuels.

o Virtually all of the plants use natural gas for their primary burner system(s). And a substantial majority of the plants feel it is not feasible, economically or time-wise, to convert from these gas burner systems to an oil system.

b) Markets for Steam

Another study was conducted recently by Elrick and Lavidge, Inc. for the State Solid Waste Management Board.* The purpose of the study was to survey and appraise the market for piped-in steam in the Bay Area. The concept of piped-in steam is to produce steam at a central disposal site and then to pipe that steam to steam-using plants within a radius not exceeding three miles from the steam-producing site.

The sample of the survey for this study was developed from a listing of the Air Resources Board. The list included locations of plants which have medium or large size boiler systems. Using this list, eight clusters of steam-using plants were identified and the survey was directed to the 32 locations in those eight clusters.

The study report dated December, 1977 has included the following findings, which are based on 22 survey responses of the 32 firms:

o In four of the eight clusters, one or more of the plants expressed some degree of interest in buying the piped-in steam. All of the responding plants in the other four clusters either indicated they are not interested in the piped-in steam or are very uncertain about it at this time.

o Data about the quantity of piped-in steam that might be purchased, by those plants interested in purchasing it, are incomplete--and, therefore, provide only an indication of the minimum quantity which might be purchased.

*California State Solid Waste Management Board, Report Digests of Four Marketplace Studies Concerning: Aluminum Beverage Cans, Combustible Waste Fuel, Hydrogen, and Piped-in Steam, April, 1978.

- The most frequently mentioned reasons for being interested in buying the piped-in steam refer to cost reduction and to apprehension about a natural gas shortage. The reasons given for not being interested in buying piped-in steam differ from one firm to another and there is no common reason which applies to many of those firms.

- Considering the aggregate viewpoint of all of the 22 plants responding to this survey, the key perceived advantage of the piped-in steam is an economic advantage. On the other hand, the more common disadvantages refer to: (1) loss of control over steam production; (2) unknown reliability of the supplier; (3) cost of hook-up system; and (4) continuing need to maintain the boilers for back-up or reserve purposes.

- It appears that much of the steam used by the plants interested in buying the piped-in steam is in the temperature range of 300° to 500° F.

- The current fuel cost, as reported by those plants interested in buying piped-in steam, for producing 1,000 pounds of steam using natural gas, ranges from $2.50 to $3.00.

- Most of the responding plants indicate that they believe there will be enough natural gas or oil at affordable prices in about five years from now.

- Virtually all of the plants responding to the questions consider gas to be their primary fuel and most of them consider it feasible to quickly and economically convert to oil usage.

B. ARRANGEMENTS FOR ASSURING WASTE SUPPLY

Once the product, user and type of facility have been determined, the next step is to identify waste quantities and specifications required, and then to assure an adequate supply of wastes to meet that demand over the life of the facility.

Estimates of waste requirements must take into account that only the light organic portion of municipal wastes (about 70% of garbage and refuse) is convertible to energy. Proposed waste reduction and recycling programs for paper, wood and garden wastes may affect quantities of organic wastes available from many communities.

The type of facility will dictate the waste specifications, i.e., whether the organic refuse is merely shredded to some specified size, or whether it is first processed to a pellet or cubette form.

Institutional issues related to waste supply include:

- o Ownership of the waste - public agency or private franchisee;
- o Front-end separation of inorganics, bulky items;
- o Processing of organic fraction to specifications;
- o Transportation of the raw or processed wastes;
- o Disposal of unrecyclables from front-end separation and of ashes and residues from the energy recovery plant.

Ownership of the Wastes--Arrangements with Waste Supplier(s)

The simplest situation is one where the jurisdiction planning the waste-to-energy facility is of sufficient size to generate an adequate supply of organic wastes, and the collection service is municipally operated. In most Bay Area jurisdictions, however, garbage service is provided by private collectors.

Although not tested in court in California, the State's Attorney General has rendered an opinion (No. S076/6, October 8, 1976) that the waste is owned by the franchisee when it has been collected under a formal arrangement with a public franchisor.

This can pose a new problem--created by the newly enhanced value of solid waste as a potential fuel for an energy recovery system. In the past, the collected material was viewed as an economic liability, something to be disposed of as readily and inexpensively as possible. Long-term franchise agreements were drawn up with this firmly in mind. The relatively recent rise in technological feasibility of energy recovery changes the economics of the situation markedly, because the value of the raw waste has potentially been greatly increased. Yet existing franchise

agreements, which are commonly signed for ten years or more, remain in effect.

However, the Attorney General's opinion goes on to state that "No contract can prevent government from requiring that solid waste be taken to a recycling center if it is determined that such action is necessary to protect the public health, safety or welfare, and if the public benefits of such action justify the hardship imposed on private parties." (Financial implications of this opinion are discussed in Section C. ARRANGEMENTS FOR PROJECT IMPLEMENTATION AND FINANCING.)

Applying these principles to an energy recovery situation, it appears that a city could require its franchisee to bring collected raw solid waste to an energy recovery facility in a case where the city's landfill could not safely accept any further waste--a condition faced by many Bay Area jurisdictions in the near future.

Again, the simplest situation is one where the jurisdiction planning the facility is large enough to generate an adequate waste supply and can justify the use of its "police power" to direct the franchisee to deliver waste to the facility. Agreements with other jurisdictions to participate in the project to guarantee sufficient quantities will require negotiations with their franchisees as well. Unless a neighboring city can also justify changing the terms of its contract to divert wastes as necessary to protect public health, safety and welfare, and produce overriding public benefits, the agency planning the facility will negotiate purchase of wastes directly with the other jurisdiction's franchisee. Securing commitments of an adequate waste supply from a number of communities has been a major problem in several otherwise highly successful waste-to-energy projects in the East and other parts of the country. These experiences underscore the necessity for securing waste supply agreements in the early stages of project development.

Conflict With Waste Reduction Programs

Not only must the facility be assured an adequate waste supply before startup, but contracts with suppliers must provide for delivery of the same quantity of wastes over the life of the facility--usually at least twenty years. Another factor that may preclude agreements with other jurisdictions and/or their franchisees is their commitment to programs for substantially reducing the amounts of wastes generated and sent to landfills. Waste paper of all kinds constitute a significant percentage of the organic part of municipal wastes. Some communities may feel that recycling paper to conserve forest resources has a higher priority than combustion with one-time, modest energy production. Other communities may plan separate collections of wood and garden wastes for mulching or composting.

Arrangements for Processing

A second set of arrangements is concerned with processing wastes to specifications of the selected energy production technology:

- o Will the raw refuse be delivered by the collector to the energy recovery plant? The plant, then, must provide front-end separation facilities on-site or elsewhere (to remove inorganic materials, mainly metals and glass), and processing equipment (for shredding or pelletizing) depending on the type of system.

- o Or will the collector accomplish the front-end separation--in a transfer station or at a landfill--and deliver unprocessed organic refuse to the facility? In this case, the facility will have to provide the necessary processing equipment, again, either on-site or elsewhere.

- o Or will the collector separate, process and deliver the refuse derived fuel to the facility?

Contracts for waste supply and residue disposal can become very complex when two or more suppliers are involved. Each jurisdiction could provide front-end separation through separate collection of metals, glass and bulky items, or through mechanical separation and deliver the organic remainder to the energy recovery facility for processing. Or one community could provide mechanical separation and/or processing equipment to handle wastes from all suppliers to the energy plant.

Marketing of products of front-end separation is covered extensively in other State Solid Waste Management Board reports, but these arrangements, as well as those for disposal of unrecyclable materials from front-end separation and of residues from the energy recovery plant, are part of the total package of arrangements for assuring an adequate supply of wastes.

Transportation of the raw or processed wastes must also be addressed. The mode of transportation, site, location and traffic patterns, the possibility of a transfer facility, all should be specified. The contract will determine which transportation arrangements are to be made by the waste supplier(s), the management agency for the facility and/or any third party(ies).

It should not be assumed that because the arrangements for securing an adequate waste supply in the Bay Area are complicated that they present an insuperable obstacle to energy recovery plant implementation. Even with massive programs to recycle paper and other fibre wastes, the nine county region generates enough organic refuse to fuel several waste-to-energy plants of various sizes. And nearly all Bay Area communities and their franchised operators are faced with a landfill shortage in the next five to ten years.

For some of the prospective plants, an extraordinary number of parties, public and private must be involved in arrangements to assure an adequate supply (e.g., the North Bay counties proposal). There is every reason to believe, however, that the refuse removal industry's long history of responsible waste disposal operations and cooperative relationships with local governments, provide a solid basis for working out the necessary arrangements to assure that waste-to-energy facilities in the Bay Area receive the wastes they require.

C. ARRANGEMENTS FOR PROJECT IMPLEMENTATION AND FINANCING

1. THE MANAGEMENT AGENCY

Many different institutional forms are possible for the management agency for an energy recovery facility. For example, it could be a city, a county, a special district, private enterprise, or any combination thereof. This section of the report explores these possibilities.

An existing institution can be the management agency for the facility. Alternatively, decisionmakers might consider the creation of a new agency. In either instance, the management entity can also be a consortium of existing and/or new institutions working co-operatively. Several of these possibilities are now illustrated in the Bay Area.

a) Management by an existing entity

If an existing agency is to manage an energy recovery facility, logical choices would be either an agency controlling all or a portion of the solid waste stream to be fed into the facility, or the entity concerned with the steam or electricity produced. Actually, other agencies are also possible. These potential choices will be taken up in order.

Agencies handling the solid waste stream at the local government level are both public and private. In most of the Bay Area's incorporated areas, the public works department or other line agency will arrange a relatively long-term franchise with a private disposal company to collect and dispose of that city's solid waste. Three cities in the nine Bay Area counties--Berkeley, Dixon, and San Leandro--undertake solid waste collection and disposal directly without a private party franchisee.

In the region's unincorporated areas, solid waste disposal is handled by counties and special districts. Types of special district authorized under State law to perform solid waste management functions include municipal utility districts, public utility districts, sanitary districts, community services districts, and others. Counties may establish county service areas for performance of this function. In all instances, counties and special districts will use the long-term franchise agreement with a private disposal company to collect and dispose of the solid waste in the jurisdiction.

Both public and private parties, therefore, are involved in this activity, and either can be the management agency of an energy recovery facility. The management agency can thus be a city, a county, a given type of special district, or a private party solid waste franchisee.

Use of a solid waste agency or franchisee as the management institution has both advantages and disadvantages. One of the most important advantages, of course, is that a significant portion of the waste stream necessary to fuel an energy recovery facility should be guaranteed. Depending on the particular situation, in fact, the entire amount might be available. The facility could even be built at the disposal site to minimize transportation costs.

The public and private arrangements for solid waste collection and disposal, however, raise a special issue regarding the waste stream. Up until recently, the solid waste collected by a private scavenger company under franchise to a local government has been considered a liability, something that one has to pay to get rid of. This fact is taken into account during the negotiation of a given franchise agreement. Lately, though, it has become increasingly clear that the accumulated solid waste may well be a resource from which important materials recovered can be extracted; ferrous metals, aluminum, glass, and paper are valuable commodities that have a given demand and can be sold. If steam or energy can also be recovered profitably from solid waste, the material is that much more valuable as a resource. Under such circumstances, and despite the assumptions underlying waste franchise agreements, the private scavenger company under contract to collect refuse from a jurisdiction may be able to sell the solid waste or even use it directly to fire an energy recovery facility.

The issue that arises is whether or not the public franchisor has certain rights to the solid waste, now considered a valuable resource, when it has been collected under formal agreement by its private franchisee. As discussed in the previous section, the issue has never been decided in court although an opinion on the matter has been rendered by the California Attorney General. This opinion, which is advisory, has concluded that the resource is owned in such a case by the franchisee. The implication, therefore, is that a public agency would not normally be able to share in profits gained by its franchisee through sale or conversion of the solid waste.

If a franchisee were able to use the solid waste more profitably than anticipated, one remedy for the public agency would be to attempt to renegotiate the terms of its existing franchise agreement to provide for the changing value of the collected resource. Unfortunately for the agency in this situation, solid waste franchise agreements are usually for a term measured in years. If the agreement were not scheduled for renegotiation soon, the franchisee would have to agree voluntarily to a "mid-term" modification. The contract could be changed only if the parties agreed voluntarily to do so.

A second problem might arise if the management agency is a private party solid waste franchisee. If a private enterprise generates electricity for sale to or use by another entity, California law requires that it be granted a certificate by the State Public Utilities Commission. Even if the facility merely generates electricity to put into the lines of PG&E, for example, it would still require PUC's approval. A city, county, or special district would not need this authorization.

Another possible arrangement with the solid waste agency or private party franchisee as management agency is that it could build and operate a facility to generate steam instead of electricity. The steam could then be transferred to a utility or private industrial user. In this case the steam generator would have to be located in close proximity to the facility using the steam.

A third alternative is for the solid waste agency or franchisee to shred or process the waste into a product more easily accepted by existing technologies. It could then sell this product to an electrical utility, or industrial user, which would not need to be located adjacent to the solid waste processing facility.

A variation on the concept of solid waste agency or private franchisee as management agency is a wastewater treatment and disposal agency as manager. The relationship is that the wastewater treatment process generates a quantity of sewage sludge, which, akin to other forms of solid waste, needs final disposal. Through the technology of co-disposal, sewage sludge can be burned along with other solid waste to produce steam and electricity. Sludge by itself is an insufficient fuel, though, and thus a wastewater agency would need to secure a supplementary supply of solid waste.

The Central Contra Costa Sanitary District has been working on this type of co-disposal facility for several years. Because it is both a wastewater agency and a solid waste franchisor, the agency has access to both forms of fuel for an energy recovery facility. It proposes to use the generated electricity to operate its newly expanded treatment plant and other on-site facilities.

Other than the Central Contra Costa Sanitary District, the West Contra Costa Sanitary District and the City of Berkeley have also demonstrated an interest in becoming the management agency for an energy recovery facility. Any Bay Area jurisdiction, including the three cities which collect and dispose of solid waste without the assistance of a franchisee, has this authority, subject to the limitations discussed above.

One private franchisee is well on the way to implementing an energy recovery facility. The Sanitary Fill Company, which disposes of solid waste under a franchise agreement with the City and County of San Francisco, is considering the possible arrangements in conjunction with its solid waste operations. Because Sanitary Fill is interested in disposal only, and not generating electricity for outside use and potential profit, it does not need PUC clearance. Sanitary Fill, in fact, would like to generate either steam or refuse-derived fuel from its solid waste supplies. If it generates steam, it could sell this product to PG&E, which could then convert it to electricity in an existing facility neighboring Sanitary Fill's Transfer Station. Sanitary Fill could also generate steam for sale to a municipal electrical agency, such as the City of Santa Clara, which has expressed interest. Theoretically, Santa Clara (or another municipally operated electrical utility) could convert the steam at the Sanitary Fill site and then pay PG&E to use its transmission lines to transport the electricity to Santa Clara. A further possibility is for Sanitary Fill to process its solid waste into refuse-derived fuel, which it could then sell to any public or private electricity agency or even to a large industrial user.

The foregoing discussion focuses on the solid waste collector, whether public agency or private franchisee, as management agency for an energy recovery facility. On the other hand, the electricity wholesaler or retailer could also be the management agency. One certain advantage to this arrangement is that this agency is already authorized by the State Public Utilities Commission as an electrical utility. Thus the permitting problem faced by a private solid waste franchisee is solved. The problem that is not solved, however, is how to secure an adequate waste stream.

The provision of electricity, like that for solid waste services, is the responsibility of both public and private institutions. The main service provider in the 9-county Bay Area, of course, is the Pacific Gas and Electric Company, a publicly regulated private corporation which both retails and wholesales electrical power.

In addition, four cities in the Bay Area have assumed the responsibility of retailing electricity to their residents--Alameda, Healdsburg, Palo Alto and Santa Clara. Alameda and Healdsburg purchase power wholesale from PG&E and retail it via their own distribution systems to city residents. Palo Alto buys power from hydroelectric facilities operated by the U.S. Bureau of Reclamation and its Central Valley Project. The supply retailed by the City of Santa Clara originates both from PG&E and the Bureau of Reclamation.

Similar to the provision of solid waste services, several different types of special district also have the authority to wholesale and retail electrical power. These include municipal utility districts, public utility districts, irrigation districts, county water agencies, and others. From an institutional standpoint, it is interesting that many of these same special districts are also authorized under State law to conduct solid waste services. The only district in the Bay Area that actually is involved in generating electricity is the East Bay Municipal Utility District, which wholesales power in connection with its water supply reservoirs.

PG&E or any of the four cities, alone or in cooperation with one another, could be the management agency for an energy recovery system. Of the five choices, Healdsburg is perhaps least likely to undertake such a project because of the town's relatively small population, solid waste stream, and power needs. Healdsburg, though, might be a customer of some other management agency. Alameda, Palo Alto and Santa Clara are all cities in the population range of 55,000 to 85,000, and each is actually now studying the feasibility of an energy recovery facility.

The City of Alameda is exploring the potential of an energy recovery facility to be managed by its Bureau of Electricity. Alameda does not by itself generate enough solid waste to run the proposed facility. Even though it would receive waste from the U.S. Naval Air Station in Alameda, it would still have to negotiate contracts with other waste suppliers. The Cities of San Leandro and Berkeley, among others, are at present discussing the matter with Alameda. Alameda proposes to generate electricity and feed it into the city's own system for distribution to its residents. The amount generated would not be enough to cover all of the city's requirements, and so it would still need to purchase a supplementary amount from PG&E, its present wholesaler. One current assumption is that the facility would be located within the city limits; if not, Alameda would need to arrange use of PG&E's transmission lines to bring the power into the city.

Palo Alto has taken a somewhat different approach. It is the lead agency in the "North County Joint Powers Agreement," an institutional arrangement formed specifically to look at the potential of energy recovery facilities. California's Joint Exercise of Powers Act allows local governments (cities, counties and special districts) to work cooperatively on any venture for which all participating jurisdictions have the same or similar legal authority. This Joint Powers Agreement includes Santa Clara County, Cupertino, Los Altos Hills, Mountain View, Palo Alto and Sunnyvale, with Palo Alto acting as lead agency. The 6 cities and the county have hired a consultant to review all options dealing with co-generation of steam and electricity, co-disposal of sewage sludge and solid

waste, and other possibilities. In contrast with Alameda, however, Palo Alto is apparently not thinking of supplanting or supplementing its current supply of electrical power with the product of proposed facilities. As of now, projections are that the electricity and/or steam would be used by large operations such as Stanford University, a Kaiser/Permanente plant, or local wastewater treatment facilities.

Santa Clara is not as far along as Palo Alto. It has agreed with the Cities of San Jose and Milpitas to look at possibilities for energy recovery from the cities' combined solid waste stream of 2400 tons per day. A feasibility study from their consultant will probably be issued in 1979, and details are sketchy. It appears, though, that Santa Clara is not anticipating using recovered energy to replace any of its current supply.

In addition to the cities with municipal electricity responsibilities, PG&E has also shown an interest in energy recovery facilities. The utility is at present completing a methane recovery project at a large landfill in Mountain View. PG&E also undertook a feasibility study of an energy recovery facility in cooperation with the East Bay Municipal Utility District and the Oakland Scavenger Company. The project proposed in the report was never implemented.

Existing institutions other than those whose major responsibility is for solid waste management or electricity supply could also be management agencies for an energy recovery facility. For example, a city or county Department of Public Works might become involved - at least in the initial or feasibility, study stages. This is now happening in Marin County, where the Department of Public Works is acting as lead agency for a consortium of four Northern California counties that have shown interest. The other three counties are Mendocino, Napa and Solano. Sonoma County, which is geographically in the center of this arrangement, has thus far declined to participate, but it is hoped by the other four counties that the Sonoma Board of Supervisors will reconsider its decision. It is likely that Marin County Department of Public Works will lead the effort only through the feasibility and planning stages, at which point an agency or interest with a more direct connection will be nominated to manage a proposed facility.

Another possibility is that a large private corporation could be the "management agency" if the steam or electricity were used at the company's industrial site. U.S. Steel's operations in Antioch could benefit from an increased supply of steam, and the company is considering an energy recovery facility for this purpose.

b) Management by a newly created entity

In addition to existing agencies or private enterprises which could manage an energy recovery facility, new institutions might also. Two possibilities exist.

One is a Joint Powers Agency. As described above, this option has been selected by Palo Alto and Marin County and their respective partners, at least through the feasibility study stage. A Joint Powers Agency is empowered to undertake any action that its constituents could undertake alone. The arrangement fosters cooperation among existing local governments, and in this instance it is especially useful because few local governments assure an adequate stream of solid waste to fuel such a facility. As demonstrated in Santa Clara County and the North Bay counties, the joint powers agreement can be used successfully for planning purposes. And if local governments can cooperate in the initial stages, it is likely that they can work together to operate and manage any facility that they jointly propose.

The other possible new "agency" to manage an energy recovery facility is a nonprofit corporation. A nonprofit corporation can be established directly by a local government and has the authority to issue bonds. These bonds are quite similar to revenue bonds and are usually federally tax-exempt for investors. However, unlike other revenue bonds, those issued by a nonprofit corporation do not need voter approval.

After a nonprofit corporation is set up, it will issue and market its bonds. Then it will build the facility--in this case, an energy recovery facility--on a piece of land which it has leased from the local government which set up the nonprofit corporation originally. The local government will then lease the completed facility back from the nonprofit corporation. Lease payments from the local government to the nonprofit corporation are pledged as security for the revenue bonds. Charges to users of the facility--in this instance, revenues from sale of steam or electricity--are in turn used to meet the lease payments.

Nonprofit corporations have seen infrequent use for environmental management purposes in the Bay Area. Although they have the advantage of being able to issue bonds without approval of the electorate, the complex lease-leaseback arrangements add length and cost to the process. Moreover, these bonds are not considered as secure as general obligation bonds, and they command higher interest rates. Sanitary Fill, in cooperation with the City and County of San Francisco, is considering a nonprofit corporation as one possible management agency for the energy recovery facility now under discussion.

Most of the energy recovery systems planned or operational now in the United States are managed by public agencies. The choice of public, private, or public/private management has an effect on financial arrangements necessary to implement the project. Issues concern a broad range of topics from the availability of publicly supported grants to the issuance of bonds and impact of tax laws.

2. FINANCING ARRANGEMENTS

This section discusses institutional considerations related to financing. It is divided into five component parts:

a. Public capital financing of energy recovery facilities.

b. Public/private capital financing.

c. Private capital financing.

d. Grants and loans.

e. Tax benefits.

The discussion of financing techniques in the first three parts is not exhaustive, nor is it repetitive of other material prepared for and available to the State Solid Waste Management Board. Each financing technique is followed by a list of the institutional participants involved and a brief statement on institutional considerations appropriate to each.

a) Public capital financing of energy recovery facilities

The first five sources of money listed below are debt financing techniques. Following these are two financing mechanisms based on current revenues.

(i) Local general obligation bonds

These are the participants:

1. The local management agency, be it a city, county or special district - it issues the bonds so that the project can be constructed.

2. Voters in the jurisdiction - they approve the bond issuance by their local government.

3. Users of the facility's services, i.e., purchasers of the steam or electricity - they pay for the services, and this money will most likely be used to pay off the bonds.

4. Taxpayers in the jurisdiction - their taxes are pledged to provide security to purchasers of the bonds in case project revenues and other sources of money are not sufficient to avoid default on the bond issue.

5. Investors - they buy the public agency's bonds.

Public agencies must have taxing authority to issue general obligation bonds. Investors will probably be very interested that taxing power is used as the security against default, because project revenues from an energy recovery facility would probably not be trusted - given the newness of the technology and type of project. The taxing power backup serves to lower the interest rate demanded by investors.

(ii) State general obligation bonds

These are the participants:

1. The State of California - it issues the bonds and acts in most cases as management agency for projects thereby implemented.

2. The State legislature - it must authorize bond sale.

3. Voters in the State - they must approve the issuance.

4. Users of the facility constructed with bond proceeds - they pay charges used to pay off the bonds.

5. Taxpayers in the State - tax revenue provides additional security to investors in case project revenues are considered questionable.

6. Investors - they buy the State's bonds.

It is not likely that an energy recovery project would be managed by the State, and thus this is an unlikely source of funds for such a project. The State could use its general obligation bonds to finance local projects and pay off its obligation with contract payments from the local management agency, but it is unlikely to do so. Voters would hesitate to approve bonds not resulting in Statewide benefits. Energy recovery facilities would probably not be financed with this

technique.

(iii) Local revenue bonds

The participants are these:

1. The local management agency, be it a city, county, special district, or nonprofit corporation - it issues the bonds so that implementation of the facility can take place.

2. Voters in the jurisdiction - they would most likely have to approve bond issuance, unless the management agency is a nonprofit corporation.

3. Users of the facility constructed with bond proceeds - they pay the revenues which alone secure the debt.

4. Investors - they buy the bonds.

Revenue bonds are, typically, a very important debt financing mechanism. They could have lesser utility in financing an energy recovery facility, however. Investors might be wary of buying bonds secured only by revenues from a project such as this because it is a relatively new type of facility and does not have much of a history in terms of technical reliability and economics. Bond purchasers would probably require a high rate of interest.

(iv) State revenue bonds

Institutional actors are as follows:

1. The State of California - it issues the bonds and usually acts as management agency for projects constructed with bond proceeds.

2. The State legislature - it must authorize bond sale.

3. Voters in the State - they must approve the issuance.

4. Users of the facility - they pay revenues which act alone as security for investors in the bonds.

5. Investors - they buy the bonds.

This is not a likely source of capital for local energy recovery projects. The reasons mentioned for State general obligation bonds all apply here as well.

(v) Joint Powers Agency bonds

These are the participants:

1. A consortium of local agencies - they agree to form a Joint Powers Agency undertaking a project, and they issue the bonds, which are essentially a form of revenue bonds.

2. Voters in the jurisdictions that have joined together - they must approve the bond issuance.

3. Users of the facility constructed with bond proceeds - they pay the revenues which alone secure the debt.

4. Investors - they buy the bonds.

The most likely participants in a Joint Powers Agency for an energy recovery facility are general purpose local governments - cities, counties, and special districts. However, only certain types of special district, such as a municipal utility district, would have broad enough authority to enter into such an agreement. Special districts with only solid waste or wastewater treatment authority could probably not enter into this type of Joint Powers Agency on equal footing with cities, counties, and more broadly empowered special districts. Also, the laws under which these bonds can be marketed have not been judicially interpreted to verify that funds could be used for energy recovery facilities, although it appears probable that it does.

(vi) Pay-as-you-go

The only institutional actor in this arrangement is the local government that has enough money to finance a project out of current revenues or surpluses. Energy recovery facilities require enormous amounts of capital, and thus this form of financing would have limited utility.

Since investment in pollution control facilities of all kinds reduces the resources available for other public programs, local governments would be

well advised not to finance energy recovery facilities out of general fund revenues.

(vii) Leasing by public agencies

Participants are as follows:

1. The management agency - a public agency leases an energy recovery facility from a public or private lessor.

2. The lessor.

3. A lending agent - it underwrites the capital costs of the facility.

Energy recovery facilities are investments where large amounts of capital are at risk, and public leasing has not been common in California for such large projects. Legal restrictions on borrowing by public agencies make lenders wary of committing large amounts of capital to this type of major facility.

b) Public/private capital financing

(i) Industrial revenue bonds

These are the participants:

1. A private industry or business such as PG&E or a solid waste franchisee - it is the management entity for the energy recovery facility and seeks to issue tax-exempt bonds.

2. The California Pollution Control Financing Authority - it is authorized to grant tax-exemption on pollution control revenue bonds issued by private industry.

3. Voters of the State - they have approved CPCFA's authorization to grant tax-exemption.

4. Users of the facility - they pay revenues to the firm which are used as security for the bonds.

CPCFA's program has been tailored mostly for air and water pollution control facilities in the past, but in June of 1977, the State legislature granted it the authority to provide tax exemption for $200 million in privately issued bonds for resource recovery projects. Also, according to

CPCFA, public agencies can benefit from this tax exemption by leasing these privately-built facilities. One stipulation is that any cost savings available to the private firm must be passed on to the user of the facility's products.

(ii) Leveraged leasing

These are the participants:

1. A private business or other party - it provides a 20 to 30 percent portion of the capital funds necessary to construct a project, and it acts as owner/lessor of the facility so as to gain certain tax advantages available to private businesses.

2. A public agency - it provides the larger remaining portion of the capital funds for construction of the project by issuing lower interest tax exempt bonds.

3. A private third party - it acts as lessee and operator of the facilities.

4. Voters in the public agency's jurisdiction - they approve bond issuance by the public agency.

5. Users of the facility's services - they pay charges to the lessee which are then returned to the private party owner and public agency in the form of lease payments.

6. Investors - they buy the bonds.

This complicated financing package, which essentially serves to marry the tax-exempt status of municipal bonds with tax advantages accruing to a private party owner/lessor, is quite new and has not been used yet for energy recovery facility. Because it appears to be a relatively inexpensive financing technique, and because public and private entities are both available to participate in an energy recovery facility, it could prove to be quite promising.

c) Private capital financing

(i) Equity financing

The private entity that finances a project with its own funds is the only institutional

participant in this form of financing. Equity financing is not likely to play a major role in energy recovery projects at this stage because the technology is yet too risky for a private enterprise to invest substantial amounts of its own equity.

(ii) Debt financing techniques

There are two participants:

1. The private organization - it is the operating and management entity of the energy recovery facility.

2. A bank or other lending institution - it makes money available in a variety of ways to the management entity.

Banks are not yet likely to underwrite innovative projects such as an energy recovery facility until the technology is better known. Thus they cannot be relied upon for large sums of money. Also, with other public/private financing techniques available that would be able to take advantage of tax-exempt municipal bonds, this method might prove too expensive for most projects.

d) Grants and loans

Federal and State agencies both have programs to help in the planning and implementation of energy recovery facilities. On the Federal side, the Resource Conservation and Recovery Act, administered by the Environmental Protection Agency, will make grants available nationwide for planning, feasibility studies and demonstration projects. Successful applicants to date under the Solid Waste Disposal Act of 1970 have included the following types of institution:

1. Cities.

2. Counties.

3. Regional councils of governments.

4. States.

5. State sponsored management agencies.

Many of these projects are for energy recovery. Unfortunately, though, the amount of Federal support has so far been minimal for projects of this type - that is, those fueled completely by solid waste or refuse derived fuel.

On the other hand, if the energy recovery facility involves co-combustion with sewage sludge, it might be implementable as part of a wastewater project. These projects are eligible to share in the wastewater construction ("201") pool of money, which provides billions of dollars yearly to sewerage agencies at the local level. Federal and State grants administered by the Environmental Protection Agency, the State Water Resources Control Board, and the Regional Water Quality Control Board, can be made for up to 87-1/2 percent of the capital costs for construction of publicly owned wastewater treatment works. These grants will not be made to private businesses; nor will they be made for projects which are not substantially wastewater oriented. As such, it is likely that a sewerage agency would have to be the management institution in this case. Also, therefore, it is likely that the energy recovered from the facility would be useful only internally to operate the treatment facility and could not be sold to outside customers.

At the State level, one program for financing energy recovery facilities is administered through the California Pollution Control Financing Authority. The program involves essentially a "grant" of tax-exemption for privately marketed industrial revenue bonds, and it has been described above.

Another State program is administered by the State Solid Waste Management Board. This agency has jurisdiction over the State Litter Control, Recycling, and Resource Recovery Fund, 20 percent of which annually is slated for resource and energy recovery projects. Grants and loans can be made to public and private entities, and the money can be used for planning, design, construction, operation and maintenance of these facilities, although its use is basically limited to demonstration projects designed to advance the state of the art. State assistance of this sort cannot exceed 75 percent of the total planning, design and construction cost of the facility. In addition, 75 percent of the operation and maintenance cost for the first three years can also be available. The 1979 Legislature has already reduced the funds that will be available under this act, and further clean-up legislation is expected to change the portion allocated for energy recovery projects.

e) Tax benefits

Tax advantages are available to public and private management institutions for an energy recovery facility. The tax benefit for a public agency is that it can issue bonds which gain interest that is exempt from Federal and/or State income tax. This means that investors will not have to pay such taxes on this interest, and therefore they will buy them at a lower interest rate than for corporate bonds, for example, which are

not tax-exempt. The latest spread between taxable and tax-exempt bonds has been about 3 to 4 percent.

The tax advantages to private management entities are different but substantial in their own right. There are two major tax benefits available to private enterprise. The first is that businesses may deduct depreciation of capital facilities from income. This is advantageous when the allowed deduction is greater than the real loss in value of the depreciated facility.

f) Equity issues

If facilities are financed through increased collection or utility rates, lower income households will be inequitably affected unless the financial plan provides for adequate levels of collection and/or utility service regardless of ability to pay.

D. ARRANGEMENTS FOR RISK MANAGEMENT OF PROJECTS*

This section addresses arrangements for risk management of resource recovery projects. Risk in resource recovery projects are identified. Ways of managing the risk are then discussed. Finally, procurement methods for the design and construction of facilities are presented, since decisions on the procurement method may influence the risk management arrangements among project participants.

1. RISK IN ENERGY RECOVERY

Risk is the possibility that an action may produce an undesirable outcome. This outcome has a value (often negative), a probability of occurrence, and consequence to the action-taker.

Because of the uncertainties associated with energy recovery technology, costs, and markets, any particular project would face a number of risks. Some of the most important risks are those which affect:

- o Waste stream: the quantity and quality of waste for processing.
- o Facility construction and operation: the cost of constructing and operating the system.
- o Marketing: the revenues from the sale of recovered products.
- o Disposal: the ability to dispose of solid waste and recovery residuals in an environmentally acceptable manner.

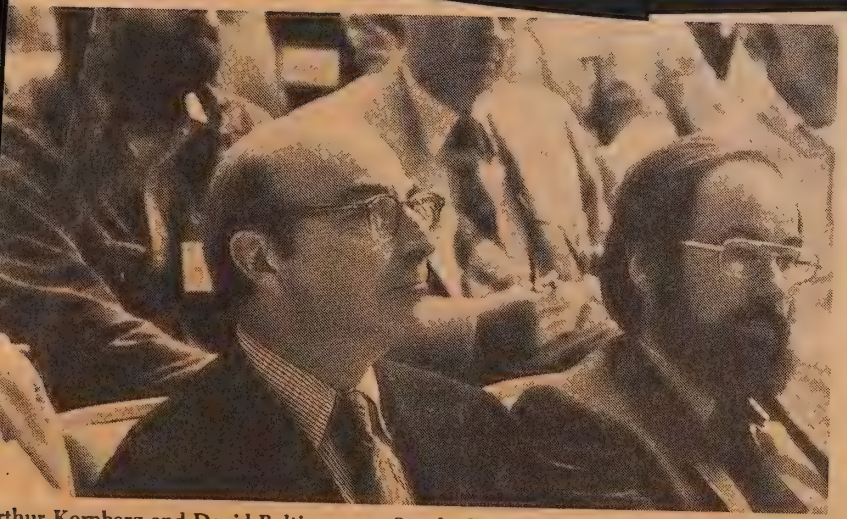
Table II.D-1 presents a list of possible risks according to the above categories. Experience to date indicates that these categories of risks concern participants in energy recovery projects most because the risks affect project economics and system reliability.

2. RISK MANAGEMENT

After risks associated with an energy recovery project are identified, they can be managed in two ways--through reduction and allocation. Risks can be reduced by preventive measures. However,

*This section is excerpted and adapted from:

- o Resource Recovery Plant Implementation: Guides for Municipal Officials, Risks and Contracts. U.S. Environmental Protection Agency, 1976.
- o Resource Recovery Plant Implementation: Guide for Municipal Officials, Procurement. U.S. Environmental Protection Agency, 1976.



rthur Kornberg and David Baltimore, at Stanford medical symposium.

advances in the neurosciences.

Progress in clinical medicine included reports by Dr. Henry S. Kaplan, professor of radiology, who described how the once-fatal cancer called Hodgkin'w disease can now be often cured, and by heart transplant pioneer Dr. Norman E. Shumway who said the success rate of heart transplants is now as good as those of kidney transplants.

In addition, techniques of Total Lymphoid Irradiation (TLI), developed by Kaplan, are now used

New training program set for physicians

An unusual program that trains young physicians in non-biological disciplines related to medicine and health affairs recently received

Silver cost may move x-rays to electronics

The high price of silver may force radiologists to move from film to electronics, according to a Stanford University radiologist.

"With the impact of integrated circuit technology and digital electronics, it is becoming feasible to store images electronically rather than on film," said Dr. William Brody, associate professor of radiology and electrical engineering.

The cost of X-ray film at Stanford University School of Medicine has increased 65 percent in the last year, said Norman Briggs, administrator of the diagnostic radiology division, and "we're expecting another 40 percent increase next month alone."

Most of the price hike results from the increase in silver values, which leaped from about six dollars an ounce in January, 1979, to $49 per ounce this January.

less expensive equipment, specifically designed for electronic radiography, he said.

Although radiographs taken electronically may not be any cheaper than those taken on film, Brody said that storage and retrieval of electronic images could involve considerable savings.

Today, Stanford radiologists store thousands of films in warehouses, and the films must be mailed when medical records are transferred to other physicians. Many films are lost.

With electronics, on the other hand, thousands of images can be stored on a single disc that may cost from six to 40 dollars, and which lasts a lifetime.

In addition, doctors may one day be able to transmit the images to each other over the telephone, or by satellite, Brody said.

Brody predicts the widespread

Stanford Campus News

Cheap energy from garbage

May 1979

Costs of obtaining energy by burning processed garbage may be significantly lowered through a new technique recently tested by Stanford engineers.

Results of the pilot test may encourage the University and surrounding communities to take a fresh look at the possibilities of cogeneration—burning solid wastes to obtain both steam and electricity.

Soaring costs for conventional fuels and a growing shortage of landfill space for garbage have sparked wide interest in cogeneration. To date, however, only one community in the U.S., a town near Boston, has actually started using garbage as an energy source.

Prof. Robert Eustis, director of Stanford's High Temperature Gas Dynamics Laboratory, led a year-long team study with $325,000 support from the Department of Energy and $100,000 from the Environmental Protection Agency.

Eustis and his colleagues found that fluidized bed boilers, a technology now used for burning coal, lignite, and wood chips, also can burn processed garbage. In a trial run, processed garbage from Palo Alto was burned at Combustion Power Co. in nearby Menlo Park.

"It worked out much better than we anticipated," Eustis said. A former director of Combustion Power, Eustis is now a consultant to the firm, which is a subsidiary of Weyerhuser.

In a second portion of the research, Eustis and his Stanford colleagues tested the economic feasibility of this process for an area like the Midpeninsula. This was based on a projected solid waste volume of 1,200 tons per day by the mid-1980s.

About one third of this would be recoverable materials, including metals, glass, and rock for fill. The remaining 800 tons would be fuel. After being ground up and processed off campus, this material could be trucked to a location near the present Stanford steam plant for burning.

The building and equipment for cogeneration from this volume of garbage would cost about $28 million, give or take 20 percent, Eustis estimated. This could generate half the electricity and all the steam needs of Stanford at a projected operating cost of about 60 percent of the present steam plant's expenses in the mid-1980s.

(The present plant's costs are projected at $7.8 million by 1982-83, compared with $4.6 million for a garbage burning facility. This would generate an average of 6.7 megawatts of electricity, compared to Stanford's current use of 11 megawatts.

(In September, 1978, Stanford shelved plans for a solid waste conversion project after spending about $80,000 of its own on a preliminary study. At that time, the University estimated an additional $1 million might be needed for further planning and said such a project might cost as much as $60 to $100 million to complete.

(Besides this capital cost, there were questions about the adequacy and availability of the northern Santa Clara County solid waste stream and the impact of environmental laws and regulations on such a major investment. At that time, Vice-President William F. Massy noted conditions could change in the future.)

A garbage cogeneration facility would require a site about the size of a football field, located close to the present steam plant. Two buildings, one to receive fuel and the other for steam generation, would be less than 50 feet high, except for twin stacks 70 feet high.

No such site has been submitted to University planners or committees concerned with land use, or even discussed informally with them. No decisions have been made on whether to proceed further.

Table II D-1 POSSIBLE RISKS ASSOCIATED WITH ENERGY RECOVERY PROJECTS

	RISK AREA	EXAMPLES
WASTE STREAM	Waste Composition	Changes in the composition of the waste stream can: (1) lower the fraction or quality of combustibles or recoverable materials and thereby reduce the revenue potential per ton of input; or (2) increase the unprocessable wastes to be landfilled and thus increase the net cost of operations.
	Waste Quantity	Reductions in waste quantity can: (1) increase the cost to process each ton of waste (because of the fixed costs associated with facilities and equipment); and (2) decrease total annual revenues and, therefore, return on fixed investment.
	Jurisdiction Withdrawal	If a jurisdiction decides to discontinue delivery of waste to a recovery facility, all the consequences of a waste quantity change plus the possibility of discontinuing recovery operations are felt by other participants in recovery operations.
	Competition from Processing Alternative	If a processing alternative attracts some of the waste that could have been processed by the recovery facility, then the consequences are the same as those for a waste quantity change. If the processing alternative is "superior" to the current system, then an opportunity to participate in more efficient processing of waste may be foregone.
FACILITY CONSTRUCTION	Delays	Delays in the completion of construction and in the start-up date can cause cost overruns in the project and necessitate the continued use of obsolete or undesirable disposal methods. Delays also result in an inability to deliver the anticipated output of the recovery plant to customers.
	Contract Suspension	Suspension of a construction contract has the same consequences as construction delays.
	Increased Capital Costs	Increases in the cost of equipment or materials during the facility construction phase can cause the cost to process each ton of waste to increase as a result of the increased fixed cost. If these increases are large enough, the entire project may be jeopardized if additional financing cannot be secured.
	Site Availability	If it proves difficult to find and acquire a facility site that is environmentally suited to recovery operations: (1) the project may be delayed; (2) the cost of operating may be increased, especially if the site is distant from the source of waste and/or the buyers of output; or (3) the project may be jeopardized.

Source: Resource Recovery Plant Implementation: Guides for Municipal Officials-Risks and Contracts. U.S. Environmental Protection Agency, 1976.

Table II D-1 POSSIBLE RISKS ASSOCIATED WITH ENERGY RECOVERY PROJECTS

	RISK AREA	EXAMPLES
FACILITY OPERATIONS	System Reliability	Excessive downtime for the recovery system may result in foregone revenues from materials or fuels that otherwise would have been recovered and sold. Inferior quality of recovered materials could result in lower prices per unit and, therefore, reduced revenues. Either event could lead to cancellation of contracts for the purchase of output. Either event also could require temporary use of a less desirable means of waste disposal. Outright system failure would have a substantial impact on the organization responsible for financing the project.
	Economic Frustration	Should the participants in the resource recovery project find it impossible to operate at a reasonable cost, the project may be jeopardized with the consequences of: (1) having to find alternative means for disposing of the waste; (2) discontinuing or revising whatever services relied upon the output of the recovery facility; and (3) satisfying debts to project financers.
	Inflation	Inflationary forces may increase operating costs faster than revenues are increasing, thus causing the project's net cost to increase. In addition, if allowable cost increases are tied to a national or state cost index and the index changes faster or slower than actual costs, then one or more participants in the project may suffer economically.
	Labor Productivity	Reductions in the productivity of labor may cause the operating cost of the project to increase or could result in an inability to process the targetted tonnage per day. The latter consequence would result in lower output of materials and reduced revenues.
	Hazardous Wastes	Should explosive, radioactive, or chemically dangerous wastes find their way to the recovery facility, the health and safety of the project's labor force and the safety of the facility itself may be jeopardized. This could result in unscheduled downtime or even cancellation of operations. The consequences could include lost revenues, increased costs, interrupted production, and temporary use of alternative disposal methods.

Table II D-1 POSSIBLE RISKS ASSOCIATED WITH ENERGY RECOVERY PROJECTS

	RISK AREA	EXAMPLES
FACILITY OPERATIONS (continued)	Legislation and Regulations	Certain legislation, especially that which could affect waste stream composition (e.g., "Bottle Bills"), waste quantity (e.g., mandatory source separation), or facility design (e.g., pollution control standards), could result in decreased revenues or increased costs per ton of waste processed. In the extreme case of removing a large portion of the recoverable fraction from the waste stream, the economic viability of recovery sub-systems may be jeopardized.
	Waste Stream Quantity and Composition	Discussed under "Waste Stream" risks.
	Storage Capacity	If the storage capacity for incoming waste or outgoing materials is not sufficient to handle emergencies (such as shut-downs, storms, etc.), then waste may have to be diverted to alternative disposal. This could affect project costs and revenues.
MARKET	Competing Materials Prices	Reductions in the price of primary fuels and/or secondary materials may drive down the prices for the recovered fuels and materials, thus reducing project revenues. If these reductions force the project into a period of economic frustration, operations may have to be discontinued.
	Substitutability of Recovered Product	Due to changes in production processes, recovered fuels and/or materials may in the future be less substitutable for primary fuels and materials. Although most trends are toward recovered materials, some are not (notably power generation where the overall trend is toward nuclear plants). The more likely event is that the specifications required of recovered fuels and materials by buyers could exceed a recovery facility's ability to produce. In either event, the revenues of the recovery project could be reduced and some of the output may have to be landfilled.
	User Incremental Costs	Buyers of recovered materials or fuels may have to make unanticipated investments in order to use them, or their operating costs may increase as a result of their use. These cost impacts may be reflected in the price that the user is willing to pay for the products--or in demands on the recovery project for user-based investments--thus affecting the recovery project's cost and/or revenues.
	Shipment Size and Frequency Requirements	Most producers require that raw material shipments be scheduled over regular intervals and sized according to their production schedules. Deviations from these requirements by suppliers can cause production problems. If a recovery project cannot consistently meet the delivery requirements of its buyers, then its marketing contracts may be cancelled. This would affect project revenues and could put the project in jeopardy.

Table II D-1 POSSIBLE RISKS ASSOCIATED WITH ENERGY RECOVERY PROJECTS

	RISK AREA	EXAMPLES
MARKET (continued)	User Specifications	Requirements by users of recovered fuels or materials for consistent quality could affect: (1) the operating cost of the recovery project; (2) the price paid by buyers per unit of output; or (3) the duration of the contract between the project and the buyer. In the extreme case of inability to meet specifications, the project may find its marketing contracts cancelled.
	User Location	A change in the locations of one or more buyers of recovered materials or fuel could affect the net price (net of transportation costs) per unit of output and (in the extreme case) the ability of the recovery project to service the buyer. In either event, the revenues of the project would be affected.
	User's Financial Condition	If the buyer of recovered fuel or materials goes out of business or is unable to pay for deliveries, the project's revenues will be correspondingly diminished.
	Legislation and Regulations	Changes in freight rates and rate structures could result in higher transportation costs (and, possibly, lower net revenues) or in cost discrimination against a recovered fuel or material. Either event could affect both the demand for and price of recovered materials and fuel.
	Contract Duration	Marketing contracts may elapse before the investment in the recovery facilities is recovered. This could place the project in a precarious position should the operator be unable to renew the contract or find new buyers.
DISPOSAL	Site Capacity	The capacity of the disposal site for residuals from the recovery operation, and for unprocessable wastes, may run out before the end of facility operations thus causing a need to find an emergency disposal site (probably at extra cost).
	Legislation and Regulations	Regulations may be implemented which require design changes for landfills (e.g., liners to prevent ground water pollution). This would increase the cost of recovery system operations.
	Site Location	A change in the location of the site for landfilling residuals could increase operating costs by requiring a longer haul from the recovery facility to the landfill.

total project risk will never be reduced to zero. The remaining risks and their potential effects must be allocated between the project participants in some fashion. One common approach is to allocate reducible risks to the party most able to control them. Another approach is to have more than one party share the large and irreducible risks, so that the impact of possible undesirable outcomes can be spread so as not to critically hurt any single party.

For discussion purposes, participants in the project can be typified as follows:

- o Sponsor of the project
- o Construction contractor for the system
- o Supplier of waste
- o Processor/marketer of waste and recovered products
- o Buyer of recovered products.

In some cases, the sponsor of the project may also be the supplier and processor/marketer of the waste and recovered products.

Table II.D-2 illustrates that certain types of contract provisions can be applied generally among the participants to managing, allocating, or sharing the risks associated with an energy recovery project.

Table II D-2 MECHANISMS FOR ALLOCATING RESOURCE RECOVERY RISKS

RISK AREA	TYPES OF RISK ALLOCATION MECHANISMS
WASTE SUPPLY AND DISPOSAL	Supplier guarantees delivery of minimum annual tonnage. Supplier has option to haul waste directly to landfill at lower dump fee if processor cannot process it. Processor guarantees to accept and process waste. Processor guarantees disposal of process residuals and availability of emergency landfill. Supplier guarantees disposal of process residuals and availability of emergency landfill.
FACILITY CONSTRUCTION	Contractor guarantees construction of operational facility for fixed price. Contractor guarantees construction of operational facility for fixed fee. Contractor has right to terminate if construction costs exceed certain agreed-to amount. Contractor guarantees construction of operational facility by fixed date and pays delay penalties thereafter.

Table II D-2 MECHANISMS FOR ALLOCATING RESOURCE RECOVERY RISKS

(continued)

RISK AREA	TYPES OF RISK ALLOCATION MECHANISMS
FACILITY CONSTRUCTION (continued)	Sponsor provides site for facility. Sponsor does not accept facility until independent tests show that it is operational according to specifications. Sponsor guarantees payment schedule for work in process. Sponsor has right of termination if delivery date is not met.
FACILITY OPERATION	Supplier pays fixed dump fee, subject only to adjustments for inflation and forces outside the control of the processor. Supplier guarantees payment of dump fee whether or not he delivers waste. Supplier's dump fee is increased according to an established price or cost index (e.g., Consumer Price Index). Processor shares percentage of revenues from sale of output with supplier. Processor guarantees fixed amount of revenues to be shared with supplier. Processor's maximum profit is fixed, with surplus shared with supplier.

Table II D-2 MECHANISMS FOR ALLOCATING RESOURCE RECOVERY RISKS

(continued)

RISK AREA	TYPES OF RISK ALLOCATION MECHANISMS
FACILITY OPERATION (continued)	Supplier's dump fee is renegotiated or adjusted up or down if waste composition or quality changes. Supplier's liability for operating or capital cost increases due to forces outside the control of contracting parties is limited. Processor's liability for operating or capital cost increases due to forces outside the control of contracting parties is limited.
MARKETING OF OUTPUT	Processor guarantees product quality. Processor guarantees product volume and/or delivery schedule. Buyer guarantees that price paid for fuel will be equivalent to the price per Btu of primary fuel. Buyer guarantees to pay minimum price per ton for materials. Processor agrees to discount price for fuel if volume purchased and/or price of primary fuel increases. Processor agrees to pay for incremental costs incurred by buyer of fuel.

Table II D-2 MECHANSIMS FOR ALLOCATING RESOURCE RECOVERY RISKS

(continued)

RISK AREA	TYPES OF RISK ALLOCATION MECHANISMS
MARKETING OF OUTPUT (continued)	Buyer of fuel agrees to buy receiving facilities from processor after successful completion of testing. Buyer agrees to accept and pay for minimum amount of recovered fuel or material. Buyer agrees to covenant anyone who should acquire his facilities to his contractual obligations with the processor.

3. PROCUREMENT METHOD

Institutional and/or organizational arrangements result in part from decisions about the particular method of procurement to be utilized. In turn, decisions on the procurement method may influence the contractual arrangements among project participants. Procurement is accomplished either on a non-negotiated (competitive bid) or negotiated (competitive or sole source) basis. The following is a discussion of the three basic procurement approaches, namely, conventional, turnkey, and full service, as well as the management of the procurement process.

a) Approaches

System procurement is only one of many activities necessary to implement energy recovery projects (see Figure II.D-1). Before procurement, planning studies are needed to provide an in-depth understanding of the area's solid waste problem, and to choose from among the many total systems options available. System procurement can begin after necessary key decisions have been made about the overall project concept. The first step is preparing a Request for Proposals (RFP) or Invitation for Bid (IFB) package. Procurement extends through design construction, and shakedown, and is completed only after the system is accepted as operational. The process of developing the RFP or IFB, soliciting and evaluating proposals, and negotiating contracts can take at least one year; detailed design and construction can require an additional two or three years.

One reason that resource recovery procurement is substantially more complex than most other public procurements is that it is not always apparent which facilities and services should be procured together.

A resource recovery "system" can be defined as a single plant, or a combination of elements of the overall solid waste management system, such as transfer stations, transport activities, and residue disposal sites. For some projects an important decision concerns which of the many required services, facilities, or equipment should be procured as a "package" from one contractor, and which should be purchased separately.

The advantages of packaged procurements include the possibility of obtaining a lower overall system cost and better system integration. Key disadvantages include procurement complexity and relative loss of control over component selections. The approaches for packaging the procurement are discussed below.

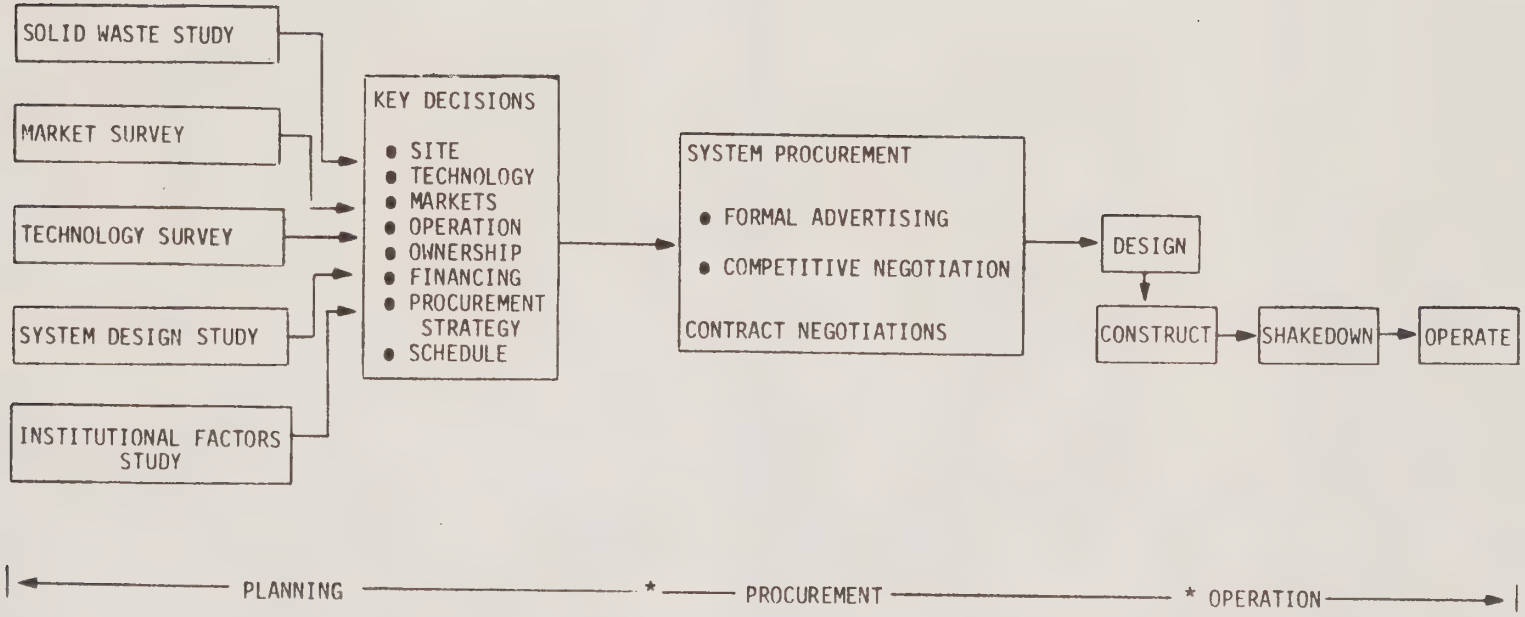


Figure II D-1 Overview: the resource recovery implementation process begins with planning studies, which lead to key decisions. Procurement extends from the selection of consultants and/or system contractors to implement the chosen system, to the system's design and construction. The process culminates in the shakedown and operation of the constructed facility.

(i) Conventional approach

The conventional approach for procuring public works projects may involve two procurements: one for engineering services and one for construction. A professional engineering consultant is hired to participate in planning and to prepare system plans and specifications which serve as a competitive bid package for construction. The same consultant might also be retained to perform other services such as construction supervision and plant startup.

(ii) Turnkey approach

An extension of the conventional approach is to assign one party total responsibility for facility design, construction, and startup. This approach involves a single procurement of services, and requires that the contractor provide a guarantee of system performance by demonstrating that the system can meet operational, rather than design, acceptance tests.

(iii) Full Service approach

A further extension of procurement packaging is the inclusion of private operation and possibly private ownership (although private operation can indeed be contracted as a separate service under any approach). Under a full service arrangement, a systems contractor has full responsibility for financing, design, construction, operation, and possible ownership. In essence, the full service contractor offers the government sponsor a disposal service instead of a facility.

Laws and procedures governing state and local government procurement of products and services vary widely among jurisdictions and appear to be changing. The variety of procedures used seems to be limited only by the ingenuity and courage of procurement officials and their legal counsel. In general, formal procurement laws and procedures are established to specify the conduct of procurements for small purchases, engineering and other professional services, construction, and equipment items.

The three standard methods normally used in procurement of these products and services are (1) purchase order, for small purchases, (2) formal advertising (including two-step formal advertising), for construction projects and equipment, and (3) negotiated procurement for engineering and other professional services. When more than one professional service firm is

being formally considered, negotiated procurement may be termed competitive negotiation. Both formal advertising and competitive negotiation can be used in the procurement of energy recovery systems and services.

4. MANAGING THE PROCUREMENT PROCESS

The management of energy recovery procurement involves a series of activities beginning when the key system decisions have been made and extending to the time when the system is fully operational. The series of activities can be divided into the following categories:

- o Preliminary activities
- o Bidder solicitation
- o Negotiation/selection
- o Negotiation/selection
- o Contract award

A flow diagram of the activities is presented in Figure II.D-2. Detailed discussion of these activities is included in the EPA report entitled, Resource Recovery Plant Implementation: Guides for Municipal Officials-Procurement.

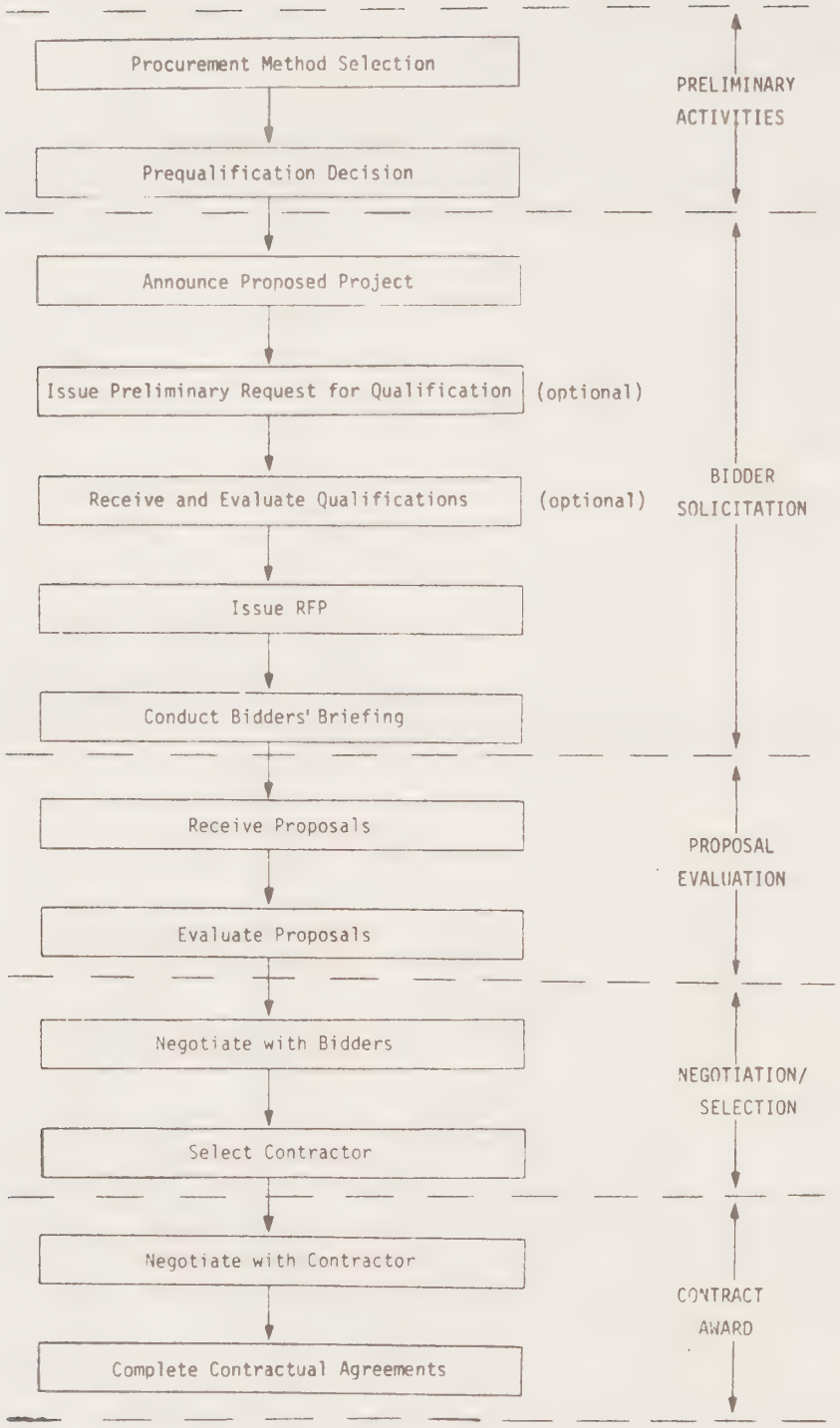


Figure II D-2 Procurement Steps: A sponsor's procurement activities are based upon previous planning (Figure 1) and range from the development of a procurement strategy to the signing of contracts. Contractor responsibilities may include design, construction, and/or operation.

E. PERMITS AND OTHER REQUIREMENTS

Resource recovery facilities are basically industrial facilities with a range of associated activities that may have undesirable impacts, environmental and social. Solid waste will be routinely delivered, usually in large garbage trucks. Physical structures may be functional and industrial in appearance. Noise, dust and odor may be associated with the processing. Solid wastes may produce health and sanitation problems. Emissions from facility processing may pollute the air. Large amounts of water may be needed for cooling. Residues may require disposal as hazardous wastes.

While local general purpose governments may consider various impacts of development activity, they are primarily authorized to control land use within their jurisdictions and enforce health and safety standards. Various other agencies at the regional, state, and federal levels have responsibilities for specific types of resources or particular forms of pollution. These single purpose agencies may be concerned with the location of a facility but are more interested in the nature, amount, and type of impacts. Complex sets of objectives, policies, standards, regulations, requirements have been developed in order to protect the public welfare. Individual agency reviews of proposed activities may compare the elements of the facility with very specific standards or with broad criteria subject to considerable interpretation. The proposed resource recovery facility may face a complex and time-consuming process before construction and operation can occur. The exact legal requirements for permits and authorizations will be determined by the technologies, size, and location of the facility.

While only the public entities may regulate a resource recovery facility, there may be necessary agreements or arrangements with the private sector. Scavengers and investor-owned utilities, for instance, may play vital parts in the success of resource recovery systems.

This section is divided into two parts. The first describes the permit and other requirements that every project must meet. The second discusses additional requirements that come into the picture under certain conditions, e.g., the proposed location of the facility, its technology, size or financing, management or marketing arrangements.

PERMITS REQUIRED FOR ALL PROJECTS

a) Local governments

The permit process begins at the local level. Often other agencies will delay processing applications until local approval is assured.

Cities and Counties - Land Use. Local governments have traditionally been responsible for controlling the uses of land in their jurisdictions. Their charge is to govern for the public welfare; each governing body must consider a wide range of local concerns in its decision-making. It has at its disposal "police power" to control development activities. Cities and counties have plans, policies and ordinances to aid in determining compatibility of uses. Zoning ordinances will specify permitted uses within areas of the city or county. The decision-makers will be concerned to locate a facility, such as an energy recovery facility, in a way to avoid interference with other activities. The governing body, aided by the planning commission and the planning department, will determine whether or not an energy recovery facility is consistent with the city or county public welfare. Conditions may be applied to ensure consistency or zoning alterations may be necessary. In some cases, they may determine that it is incompatible and disapprove the facility entirely.

In addition to general plan elements, each county has a county solid waste management plan approved by the State. Both the county solid waste management agency and the State Solid Waste Management Board must make a determination of consistency with the plan. If the facility is located in the unincorporated area, coordination of the land use permit, building permits and solid waste permit could be easily accomplished; the Board of Supervisors has the final authority in all cases.

Cities and Counties - Health and Safety. Any new development will be subject to regulation to ensure safe construction; inspection and enforcement are the responsibilities of local governments. A resource recovery facility may have specific components that require additional review and inspection by responsible agencies to protect public health and safety.

- Structural Compliance

  The city or county public works department will review construction plans and inspect a structure prior to operation to ensure compliance with the local ordinances. The facility must meet such standards as building, plumbing, electrical, fire safety, and grading, before construction and operation can occur. Usually coordination with the planning department that issues land use permits is routine.

- Solid Waste Management Requirements

  All solid waste management facilities, including energy recovery facilities, are subject to regulation. This takes the form of a permit process administered by the designated local enforcement

agency; the State Solid Waste Management Board must also approve the facility.

A local permit to operate a resource recovery facility will be issued if the proposed facility is consistent with the approved county solid waste management plan and with the state standards for storage and handling of solid waste. The standards apply to all facilities, equipment, or vehicles used for storage, removal, or transport of solid wastes. Provisions in the following areas could be relevant to energy recovery facilities:

o Solid Waste Storage and Collection Standards

--Storage of solid wastes - design, operator responsibility, containers

--Solid waste removal and collection - frequency, operator qualifications, ownership of materials

--Collection and transportation equipment - construction, safety, parking, inspection

o Solid Waste Disposal Standards

See discussion of Requirements for Ash Disposal under Water Quality, pp. II.E-15.

o Public Health and Sanitation

State standards for ensuring that solid wastes are stored and handled in ways that protect public health were developed by the State Solid Waste Management Board and the State Department of Health. The standards are enforced by the local enforcement agency (in many cases the county health department). A permit to operate would be required for an energy recovery facility.

The State Department of Health retains responsibility for regulating the handling, processing, and disposal of hazardous wastes. Any energy recovery facility that receives, stores or handles hazardous wastes must obtain a permit. "Hazardous waste" is defined by the California Hazardous Waste Control act of 1972 as:

> ...any waste material or mixture of wastes which is toxic, corrosive, flammable, an irritant, a strong sensitizer, which generates pressure through decomposition;

heat or other means, if such a waste or mixture of wastes may cause substantial personnel injury, serious illness or harm to wildlife, during or as a proximate result of any disposal of such wastes.

b) Regional Agencies - Environmental Quality

Air Quality - Bay Area Air Quality Management District (BAAQMD). Solid waste-to-energy projects in the Bay Area must be designed and operated in conformance with a complex set of air pollution regulations. The Bay Area Air Quality Management District is the primary enforcement agency, although the California Air Resources Board and the federal Environmental Protection Agency also have the authority to deny permits in specific cases.

The specific regulations which may be applied to permit applications for waste-to-energy projects can be divided into two groups: emission limitations and new source review. These requirements are contained in the BAAQMD's Regulations 2 and 7.

- o Emission limitations are contained in Divisions 4 and 5 of Regulation 2, and Rule 3 of Regulation 7--Division 4 applies to incineration and salvage conditions, Division 5 applies to heat transfer operations, while Rule 3 of Regulation 7 applies to solid waste incinerators. As summarized in Table E-1, limitations are slightly different in each case, and it is unclear at this time which category would apply to waste-to-energy projects. This uncertainty is likely to continue until the first permit application is made. Energy recovery projects must meet these specific emission requirements regardless of the project's disposition with respect to New Source Review. Based on available technology, it appears that meeting these emission limitations will not pose a significant technical problem to waste-to-energy projects; however the cost of such control technology may still prove to be a significant burden.

- o The New Source Review requirements are more complex and constitute the most difficult hurdle for waste-to-energy projects. A New Source Review rule has been in effect in the Bay Area for several years. In 1973, the BAAQMD adopted a New Source Review rule to comply with the less specific EPA requirements in effect at that time. In September 1976, the rule was amended to include several changes requested by ARB. Since that time, the BAAQMD has been studying various alternative forms of New Source Review in an effort

Table II E-1 Summary of BAAQMD Emission Limitation Rules

Pollutant	Heat Transfer Processes and incinerators ⊥ 50 tons/day (Regulation 2)	Incinerators 50 to 100 tons/day (Regulation 7)	Incinerators ⊥100 tons/day (Regulation 2)
Particulates.....	Opacity-Ringelmann 1	0.08 gr/SCF	0.05 gr/SCF
	Grain loading-0.15 gr/SCF		
	Process weight-up to 40 lbs/hr. max.	others same	others same
	No incandescent particles from emission point		
	Soot blowing for fuel oil combustion controlled		
Sulfur Dioxide....	Emission limit-300 ppm or monitor at ground level	same	same
	Ground level-0.5 ppm for 3 min. 0.04 ppm for 24 hrs.		
	SO_2 grain loading-0.04 gr/SCF acid plants 0.08 gr/SCF sulfur plants		
Organic Gases....	Emission limit-	same	same
	25 ppm carbonyls from incinerators		
	25 ppm hydrocarbons from incinerators		
Oxides of Nitrogen.....	No regulations	none	none

to comply with more recent State and Federal guidance.

On December 21, 1976, the Environmental Protection Agency published its Interpretive Ruling for implementation of New Source Review nationwide. This ruling provides guidance to State and local air pollution control agencies and establishes minimum acceptable requirements for the review of new and modified stationary sources. Based on these minimum requirements, any state air pollution control district applying rules which could be construed as being more lenient would not comply with EPA policies or the Clean Air Act (which subsequently incorporated the EPA Interpretive Ruling by reference). The two fundamental features of the Interpretive Ruling are: a requirement for lowest achievable emission rate (i.e., use of best available control technology) for all new and modified sources, and a provision to allow applicants to acquire "emission offsets" to support their permit applications. The offset concept means that if an applicant can cause emissions from some existing source or sources in the region to be reduced such that the air quality impact of the applicant's source would be offset, then a permit could be granted. Specification of conditions on what constituted an allowable offset were left vague, although it was clear that the amount of the offset emissions must be at least as great as the emissions from the proposed source, and that tradeoffs between sources with differing ownership was allowed.

State guidance on New Source Review began with the adoption by ARB in October 1975 of a model New Source Review rule for consideration by air pollution control districts throughout the state. On October 8, 1976, a refined version of the model rule was adopted by ARB for the South Coast Air Quality Management District. Since that time and in the wake of the now famous Dow Chemical decision, the State legislature has adopted resolutions requesting ARB to (1) hold hearings to determine the consistency of the BAAQMD New Source Review rule, (2) proposed alternatives to the rule, and (3) consider community guide trade-offs as part of the New Source Review program.

On December 20, 1977, ARB adopted a similar rule for the Bay Area Air Quality Management District. Ironically, the BAAQMD staff and Technical Advisory Council had developed proposed changes to the New Source Review rule which had many similar provisions

Table II E-2

COMPARISON OF NEW SOURCE REVIEW RULES (NSR)

		Present Rule (December 20, 1977)	Proposed Staff Rule	Former District Rule (1309)
1.	No NSR required	Less than 15#/hr	Less than 15#/hr	Less than 4#/hr
2.	New source greater than 15#/hr	BACT required on new source	BACT on new source	No BACT requirement. Must not interfere with AQS
3.	Modified source greater than 15#/hr	BACT required on entire facility if facility emits more than 15#/hr after modification.	BACT required only on modification emitting more than 15#/hr.	No BACT requirement. Must not interfere with AQS
4.	New source greater than 25#/hr	Denial, unless emissions do not interfere with AQS (See Trade-Off)	Denial if in an area where AQS is exceeded (See Trade-Off)	Denial if emissions interfere with AQS (No Trade-Off)
5.	Modified source greater than 25#/hr	Denial, unless emissions do not interfere with AQS	Denial if in an area where AQS is exceeded	Denial if emissions interfere with AQS
6.	"Internal "Trade-Off"	Allowable if no net increase in emissions and no net AQ deterioration	Allowable if reduction of emissions occurs (1311, 1311.2)	Allowable if reduction of emissions occurs (1311, 1311.2)
7.	Exemptions to NSR	a) Replacement and no increase in emissions	Replacement and significant emissions decrease	Replacement and significant decrease in emissions
		b) Demonstrable AQ benefit - external trade-off. Approval of ARB required	External Trade-Off. 1.2x the emissions of new or modified source. No approval required from ARB	No external trade-off allowed.
		c) Innovative control Technology. ARB o.k.	Innovative control - ARB O.K.	No exemption for innovative control
		d) Extraordinary public health benefits. ARB o.k.	Extraordinary public health benefits. ARB o.k.	No exemption for extraordinary public health benefits

* These are the rules which either have been or are being enforced in the Bay Area. The present rule conforms with EPA's interpretive ruling on New Source Review.

to the ARB-adopted rule. A comparison between the present ARB adopted rule, the BAAQMD staff proposed rule, and the former BAAQMD rule is presented in Table E-2. Most recently (February, 1979), ARB has decided that the present ARB-adopted rule does not fully satisfy the requirements of the 1977 Clean Air Act Amendments, and has developed a new model NSR rule for consideration statewide.

Table E-2 indicates that both ARB and BAAQMD were moving toward compliance with the EPA Interpretive Ruling. The most significant area of disagreement between the two agencies is now shown in the table, and concerns the BAAQMD definition of "significant" impact.

The specific provisions of the New Source Review rule applicable in the Bay Area have been and may continue to be in a state of flux. To fully understand the current situation, it is necessary to provide the following background information.

o Legal Basis for New Source Review Rules

The legal basis for New Source Review Rules may be found in the federal Clean Air Act and the California Health and Safety Code. The 1977 Amendments to the Clean Air Act require as part of Section 110 (a)(2)(D) that states must have:

> "....a program to provide for the enforcement of emission limitations and regulation of the modification, construction, and operation of any stationary source, including a permit program...to assure that national ambient air quality standards are achieved and maintained..."

Section 129 of the 1977 Clean Air Act amendments requires, in part, that each state should have an enforceable permit program which requires new and modified stationary sources to meet "lowest achievable emission rates." Section 129 (a)(1) further specifies that the "emission offset" concept introduced by the Environmental Protection Agency in an Interpretive Ruling on New Source Review (published December 21, 1976) shall apply to proposed major stationary sources applying for a permit in a non-attainment area. These concepts will be discussed in a subsequent section.

In California, Section 42301(a) of the State Health and Safety Code requires that air pollution control district permit systems ensure that a pollutant source:

> "...for which the permit was issued, shall not prevent or interfere with the attainment or maintenance of any applicable air quality standard."

In addition, Section 40001 of the Health and Safety Codes requires air pollution control districts to adopt and enforce rules which assure that reasonable provision is made to achieve and maintain the State and federal ambient air quality standards. The California Air Resources Board interprets these sections of the law as well as the State Implementation Plan requirements under the federal Clean Air act, as providing both a mandate and clear authority for adoption of New Source Review rules.

o Previous New Source Review Efforts

Because of the recent history of change in New Source Regulations, it would be shortsighted to concentrate on the present rule. To illustrate that New Source Review is in flux, and to review areas of disagreement, this section describes previous New Source Review efforts.

The procedures previously applied by the BAAQMD defined "significant quantity" as those emissions that would result in ambient air quality concentrations which are detectable by equipment presently used for air quality monitoring purposes. Therefore, the quantity of emissions found to be "significant" and which makes a source subject to denial varied with the point of release of the pollutants to the atmosphere and other dispersion parameters as well as the rate of emissions. The determination of significant quantity was based on the use of a Guassian air quality model to determine probable downwind concentrations, and was referred to as the PERMTEST. Based on this test, a source with emissions that result in ground level concentrations below the sensitivity of air quality monitoring instruments could be granted a permit regardless of the amount of contaminants emitted from the source. In other words, large emissions of a pollutant could be deemed "nonsignificant" if such emissions were vented through a tall stack at high temperatures thereby increasing dispersion of the pollutants.

An example of a large stationary source of pollution for which the emissions and air quality impact were judged "nonsignificant" under the previous BAAQMD New Source Review rule is the proposed PG&E 400 megawatt combined cycle power plant. Emissions from the proposed power plant are estimated to be 1050 lbs/hr of oxides of nitrogen, 976 lbs/hr of sulfur dioxide, 200 lbs/hr of particulate matter, 52 lbs/hr of organic gases, and 500 lbs/hr of carbon monoxide. In contrast an asphalt concrete plant with estimated emissions of 24 lbs/hr of NOx, 6 lbs/hr of SO2, 11 lbs/hr of particulate matter, and 7 lbs/hr of organic gases was denied a permit to construct by the BAAQMD. The NOx and particulate matter emissions were determined to be significant under the PERMTEST, and air quality standards for those pollutants were being violated in the vicinity of the proposed source. Apparently, ARB is opposed to procedures which would lead to this type of result because they feel that total emissions is a better indicator of air quality impact than the modeling procedures and instrument sensitivity criteria used by the BAAQMD.

o Summary of the Present New Source Review Rule Adopted by ARB

This section highlights the key provisions of the present New Source Review rule. The full text of the rule is contained in Appendix A.

Definition of stationary source. A stationary source is defined in the present rule in terms of the entire facility. Such a definition prevents a large facility from being divided into many permit units to avoid compliance with BACT requirements or to avoid the requirement that air quality impacts of the entire stationary source be reviewed. While the impact of a single piece of equipment may be small, the impact of an entire stationary source may be great. The proposed amendments provide for the consideration of all of the emissions from complete stationary sources rather than emissions from each permit unit.

Review cutoff levels for air quality impact analysis. The review cutoff levels identify stationary sources which are subject to air quality impact analyses. Such review cutoffs have replaced the BAAQMD concept of "significant quantity" of emissions. Sources whose emissions are less than the cutoff levels need not be reviewed under these rules before such sources are constructed or modified. The ARB staff believes that emissions cutoffs of 25 lbs/hr and 250/lbs/day

(for all pollutants except CO for which the cutoffs are 250 lbs/hr, 2500 lbs/day) will result in effective regulation of new sources without creating substantial administrative difficulties and unnecessary delays in construction of new and modified sources. Such cutoffs permits smaller projects with limited financial resources to be constructed without having to meet the NSR requirements.

Best Available Control Technology (BACT). An important provision of the present rule is the requirement for use of best available control technology by certain new and modified sources. Under these requirements, all new sources and the modifications to existing sources must apply BACT if the emissions from a source will exceed 15 lbs/hr or 150 lbs/hr for all pollutants (except carbon monoxide, for which the limits are 150 lbs/hr or 1500 lbs/day). Furthermore, if modifications to an existing source would cause a net increase in emissions from that source, BACT must be applied throughout the entire source or to the extent necessary to demonstrate there will be no net increase in emissions. Exceptions to this requirement are provided for small businesses and for those businesses which can demonstrate that extending BACT to the existing facility would present a substantial financial burden. However, those sources must also have emission control systems in operation.

Trade-offs. Another significant provision of the present rule wuld allow the Air Pollution Control Officer to consider the air quality impacts of emission reductions achieved elsewhere in the Air Basin. These emissions reductions, referred to as off-site trade-offs, may be brought about by modifying or decommissioning other stationary sources, provided such trade-offs are legally enforceable and will continue during the period of operation of the source or modification thereof for which a permit is being sought.

The present rule provides for trade-offs for the same pollutant from sources owned by the applicant. This provision requires at least one-for-one emissions reduction and air quality trade-off. Another section of the proposed rules provides an exemption from the air quality impact provision for sources for which trade-offs from non-owned sources are provided. This exemption also allows interpollutant trade-offs (e.g., reduction in hydrocarbon emissions in exchange for increase NOx emissions). In order to qualify for

this exemption, it must be shown that there will be demonstrable air quality benefits within the Air Basin as a result of the trade-offs. To prove that the requisite air quality benefits will result, overall reductions in emissions must be greater than emission increases (the magnitude of the net emission reduction is to be determined on a case-by-case basis).

Both trade-off provisions require demonstration of an air quality trade-off rather than a simple emission offset. This means that, in most cases, an air qualty impact analysis must be performed and a determination made that those areas that would otherwise be adversely affected by increased emissions from the applicant's source will benefit from the offsetting emission reductions from the trade-off sources. In order to obtain a permit, the power plant mentioned earlier would have been required to provide for such air quality trade-offs.

Exemptions. A number of other exemptions from the air quality analysis requirements are contained in the present rule. Exemptions are allowed for replacement sources, sources providing essential public services, sources switching from natural gas to fuel oil, sources installing only air pollution control equipment, and portable sandblasting equipment. In addition, two special exemptions are provided for sources promoting and utilizing "innovative air pollution control technology" and for sources which provide "overriding environmental or public health benefits." These phrases are currently undefined.

Alternative Approaches to New Source Review for Solid Waste Energy Recovery Projects

At present, there are essentially three ways in which New Source permits could be granted to projects:

- Projects could either be sized or otherwise designed to emit less than 25 lbs/hr or 250 lbs/day of any pollutant (15 lbs/hr or 150 lbs/day if the BACT requirement is to be avoided);
- Emission offsets could be identified and/or acquired;
- An exemption could be granted, based on any one of three grounds - providing essential public services, use of innovative technology, or extraordinary environmental or public health benefits to accrue from the project.

It is not clear at this time precisely which approach should be adopted - much depends on the size of facilities to be used, and how much money can be provided for pollution control equipment in each case. In addition, it would be prudent for the State Solid Waste Management Board to seek clarification from ARB as to whether Solid Waste Energy Recovery Projects, as a category, could qualify for exemption from New Source Review.

Water Quality - Regional Water Quality Control Board (RWQCB). Energy recovery systems may generate wastewater and ash as by-products that would impact surface and ground water quality. Examples of the wastes include:

- o Scrubber effluent (wastewater) resulting from scrubbing the afterburner off-gas of the combustion systems.
- o Quenching water of certain pyrolysis systems (e.g., Union Carbide's Purox System).
- o Condensor cooling water from steam and electricity generation systems.
- o Ashes resulting from combustion processes.

The following is a discussion of the treatment and disposal requirements for the wastewater and ash.

Wastewater treatment requirements. Wastewater resulting from energy recovery operation is considered as industrial wastewater. It has to be treated before it is discharged to receiving waters. The other alternative is to discharge the wastewater to a municipal collection and treatment system for treatment and disposal.

For industrial wastewater discharging directly to receiving waters, the Clean Water Act of 1977 requires the best conventional pollutant control technology be used by July 1, 1984. In addition, a discharge permit is required. The permit system is mandated by the Federal Water Pollution Control Act (FWPCA) amendments of 1972, and is called the National Pollution Discharge Elimination Systems (NPDES). In California, EPA has delegated the permitting authority to the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCB).

For industrial wastewater discharging to a municipal system, State and local agencies may require pretreatment of the wastewater for removal of certain pollutants that are not compatible with the municipal treatment system. The pretreatment requirements are part of the local source control programs mandated by the FWPCA and the State Water Resources

Control Board.

Requirements for scrubber effluent. The quality of scrubber effluent depends on the size of the energy recovery system. It would be relatively expensive to treat a small quantity of wastewater to meet all the NPDES permit requirements and then discharge the effluent to receiving waters. Therefore, it would be more practical to discharge the scrubber effluent to a municipal system for treatment.

A scrubber influent analysis has been included in the Solid Waste Resource Recovery Full Scale Test Report of the Central Contra Costa Sanitary District. Judging from the analysis, pretreatment of the scrubber effluent for removal of certain pollutants may not be needed before such effluent is discharged to a municipal system for treatment.

Requirements for Quenching Water. Quenching water resulting from pyrolysis systems may contain heavy metals and other pollutants. Therefore, pretreatment of the quenching water would be required before it is discharged to a municipal system for treatment. However, the municipal system may not accept the quenching water at all if the quantity of wastewater is relatively large compared to the treatment capacity of the municipal system. In that case, quenching water would have to be treated separately to meet all the NPDES permit requirements in order to discharge to receiving waters directly.

Requirements for cooling water. The amount of cooling water is usually large but it contains few or no pollutants. Therefore, it is usually discharged to receiving waters directly. However, the discharge may increase the temperature of receiving waters near the point of discharge. Such change in temperature may have an impact on the immediate aquatic environment.

Discharge of cooling waters is regulated by the Regional Water Quality Control Board, State Water Resources Control Board, and EPA. Thermal discharge and NPDES permit requirements would have to be met. In addition, other agencies, such as State Department of Fish and Game and U.S. Fish and Wildlife Services have review functions on the discharge.

Existing regulations of the RWQCB may preclude the discharge of "once through" condenser cooling water unless certain conditions are met. In essence, the discharge would have to demonstrate to the satisfaction of the regulatory agencies (RWQCB, SWRCB, and EPA) that:

- The effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish

and wildlife in and on the body of water into which the discharge is to be made.

- Proposed alternate effluent limitations will assure the same protection.

A discussion of how the above could be demonstrated is presented in Section VII of a report entitled, Environmental Implications of a Proposed Refuse-Fired Power Station, prepared for the Bureau of Electricity, City of Alameda.

Requirements for ash disposal. The disposal of ashes resulting from combustion processes is regulated mainly by the SWRCB and the RWQCB. In order to protect ground and surface water quality, the SWRCB developed the following system for waste and disposal site classifications:

> Group 1 Wastes. Group 1 wastes consist of or contain toxic substances and substances which could significantly impair the quality of usable waters.
>
> Group 2 Wastes. Group 2 wastes consist of or contain chemically or biologically decomposable material which does not include toxic substances nor those capable of significantly impairing the quality of usable waters.
>
> Group 3 Wastes. Group 3 wastes consist entirely of nonwater soluble, nondecomposable inert solids.
>
> Class I Disposal Sites. Class I disposal sites are those at which complete protection is provided for all time for the quality of ground and surface waters from all wastes deposited therein, and against hazard to public health and wildlife resources.
>
> Class II Disposal Sites. Class II disposal sites are those at which protection is provided to water quality from Group 2 and Group 3 wastes. The types of physical features and the extent of protection of groundwater quality divides Class II sites into two categories:
>
> > Class II-1 sites are those overlying usable groundwater with geologic conditions that are either naturally capable of preventing lateral and vertical hydraulic continuity between liquids and gases emanating from the waste in the site and usable surface or groundwaters, or the disposal area has been modified to achieve such capability.

Class II-2 sites are those having vertical and lateral hydraulic continuity with usable groundwater but for which geological and hydraulic features such as soil type, artificial barriers, depth to groundwater, and other factors will assure protection of the quality of usable groundwater underneath or adjacent to the site.

Class III Disposal Sites. Class III Disposal sites are those at which protection is provided to water quality from Group 3 wastes by location, construction, and operation which prevent erosion of deposited material.

At present the RWQCB determines the waste classification of ashes on a case-by-case basis. A major concern of the regulatory agencies is the heavy metal concentrations in the ash. If the ashes are classified as Group 1 wastes (hazardous wastes), they have to be disposed of at Class I or Class II-1 sites. Since there are only three Class I sites in the Bay Area, disposal of large quantities of ash may become a problem.

The handling of ash would also be regulated by the State Health Department of the local enforcement agencies for hazardous waste management if the ashes are determined to be hazardous.

It is therefore necessary to obtain data on chemical composition of the ash--before full scale operation of the energy recovery facility--so that proper ash handling and disposal can be arranged.

c) State Agencies - Resources

Energy - Energy Conservation and Development Commission/Public Utilities Commission. The permits and authorizations required for an energy recovery facility from agencies responsible for regulating energy generation will be determined by the size of the facility, the ownership, the product, and the relationship to the energy user. Alternative technologies being considered include:

- o Waterwall Combustion - production of marketable steam (may be used for heating and cooling, electricity generation, or to drive machinery in industrial processing)

- o Solid Refuse Derived Fuel Systems (RDF) - production of supplementary fuel for fossil-fuel fired steam generators.

- o Pyrolysis System - production of gas or pyrolytic oil (may be used to produce steam and then generate electricity).

- o Biological Gassification System - production of methane gas to use as a substitute for natural gas.

- o Waste-fired Gas Turbine Systems - combustion of solid waste resulting in production of high pressure gases that drive a gas turbine (then may produce electricity).

The energy recovery facility may be designed to generate electricity on site; the resultant power could be used for operating other on-site facilities or could be used by adjacent industries. The electricity could be sold, either wholesale or retail, for use off-site. Some of the technologies above produce a solid, liquid, or gaseous fuel that can be transported by pipeline or truck to users.

An energy recovery facility that produces electricity may be subject to state or federal regulation. Any electric generating facility above 50 megawatts must receive a certification by the State Energy Resources Conservation and Development Commission; if the facility is a fuel producer only, then no Energy Commission Approval is required. Use of cogeneration technology would be of interest to the Energy Commission staff and they would be interested in reviewing such projects.

Any privately-owned utility proposing a recovery facility would be regulated by the California Public Utilities Commission. (Municipal utility districts are not regulated by PUC.) PUC regulates retail rate setting for the sale of electricity. Power sale from one utility to another would be considered a wholesale transaction and would not be subject to PUC approval. If the energy recovery facility produces a fuel product (steam, oil, gas) that is sold to a user, PUC would not be involved.

It is very likely that any resource recovery project in the Bay Area that generates electricity will involve PG&E or the Northern California Power Association. PG&E or NCRA could be an owner-developer of a project, a customer for power generated, a supplier of supplementary power.

OTHER REQUIREMENTS FOR ALL PROJECTS

a) Public agency review and comment

Office of Planning and Research. At the state level, the Governor's office of Planning and Research might review a

resource recovery facility in light of other statewide objectives for development and environmental quality. OPR's clearinghouse function would be responsible for notifying other state agencies that may have an interest in the project.

Association of Bay Area Governments. In the San Francisco Bay Area, the Association of Bay Area Governments (ABAG) is designated to plan for regional solid waste management issues. ABAG's EPA-funded Environmental Management Plan includes a Regional Solid Waste Management Plan; the EMP was approved by local government delegates to the ABAG General Assembly in June 1978. The EMP also includes plans for water and air quality. The Air Quality Maintenance Plan (AQMP) is intended to meet federal air quality standards by 1982 in the Bay Area; recommendations have significant implications for resource recovery facilities with air emissions. (The EMP must now be approved by State agencies and by EPA.) It will then become the official plan for the San Francisco Bay Area to meet federal and state air, water and solid waste standards, to be administered by the appropriate State, regional and local agencies.

Actions under the solid waste portion of the EMP include regional review by ABAG of resource recovery facilities to ensure consistency with regional solid waste management and other environmental goals and standards. The Plan supports research and demonstration projects to obtain additional information needed for large-scale resource recovery planning; for example, on air and water quality and other environmental effects; on environmental benefits to justify trade-offs with air regulations, etc., it recommends ABAG advocacy of Federal and State action to support waste reduction and materials and energy recovery.

In addition, if a resource recovery project were eligible for federal funding, ABAG, under OMB Circular A-95, would make recommendations to the federal funding agency concerning the project's consistency with a range of regional objectives and policies.

c) Environmental Impact Statement/Environmental Impact Report Requirements

The National Environmental Policy Act of 1970, usually referred to as NEPA, requires that for every major Federal action significantly affecting the quality of the human environment, there be prepared a detailed report on these effects. The Environmental Impact Statement (EIS) would be done by the responsible Federal agency. In the case of energy recovery facilities, this would most likely be the Environmental Protection Agency, or possible the newly created Department of Energy.

Virtually all of the money spent to date by Federal agencies, however, has been for feasibility studies, which would also have the purpose of accumulating enough environmental impact data so that a proper report could be prepared. An EIS would not be required for a Federal agency to make its decision on a feasibilility study grant.

In contrast, an EIS would probably be necessary for the Federal agency to approve a construction grant for a demonstration project. A sufficient amount of information, accumulated during the feasibility study period, would be filed with the grant application, and the funding agency would then have the responsibility for preparing and issuing a draft EIS on the project. After appropriate public review and comment, the draft would be converted into a final EIS. The Federal agency's decision on funding could then take place.

The California Environmental Quality Act of 1970, or CEQA, mandates the preparation and circulation for public review of an Environmental Impact Report (EIR). The intent of the EIR requirement is to ensure that the government agencies at all levels responsible for a project will consider its environmental impacts during their decision-making process.

An EIR is prepared by the lead agency for a project. In the instance of an energy recovery facility, this would be either the management agency (assuming it is a public agency), a local agency responsible for issuing a building permit or zoning approval, or a State agency assisting in project financing. The lead agency would normally be responsible for preparation of the EIR, although a State lead agency might be able to delegate this to a local agency. After appropriate review and comment of a draft EIR has taken place, the responsible agency will prepare and certify a final EIR. This process would satisfy CEQA requirements for both local and State project approvals.

In a fashion similar to the EIS, an EIR would not be required for a State agency to approve a feasibility study grant. Furthermore, the State Solid Waste Management Board has not yet considered a grant for construction of a demonstration project. Before such a grant can be approved, an EIR will be necessary.

In a situation where both an EIS and an EIR would be required, they can be consolidated into one document. The Central Contra Costa Sanitary District has done this for its co-disposal project.

c) Public Participation Requirements

Federal and State law, while not necessarily requiring formal public hearings or other involvement, have recently

strengthened guidelines concerning citizen participation in the development of publicly financed or regulated projects such as an energy recovery facility. A public hearing would normally be held in conjunction with an Environmental Impact Statement or an Environmental Impact Report. Further than this, many applicants actively solicit additional citizen participation throughout the planning and implementation process.

Therefore, if an energy recovery facility is to be undertaken by a public management agency, this agency would be likely to have its own set of procedures governing public involvement, both formal and informal. If private industry is slated to manage the project, it is more likely that public participation would be limited to a formal hearing on the Environmental Impact Report.

2. PERMITS AND OTHER REQUIREMENTS UNDER CERTAIN CONDITIONS

a) Location of Proposed Facility

Facility located within a Special District. If an energy recovery facility is located within a special district that has solid waste management responsibility, it may be subject to the District's handling and disposal regulations.

Facility located on San Francisco Bay Shoreline - Bay Conservation and Development Commission. In recent years state and regional concern for conserving significant land and water resources have resulted in the formation of agencies with land use authority that supersedes local authority. The San Francisco Bay Conservation and Development Commission (BCDC) has regulatory authority over a 100-foot wide band around the shoreline of the Bay. The Bay Plan for San Francisco Bay is the basis for judgment on permit applications. BCDC designates certain shoreline areas for priority uses and others that are critical to the health of the Bay. A resource recovery facility proposed for the Bay shoreline must be consistent with a series of policies regarding bay fill, water-related industry, recreation, public access, appearance and design, and other uses of the Bay.

The consistency of an energy recovery facility with BCDC policies would be determined on a case-by-case basis. The BCDC legislation allows for location of power plants on the Bay shoreline. On the other hand, according to the Bay Plan, a facility that requires large amounts of water for cooling is considered a "water-using industry", not a "water related industry" and does not necessarily need the shoreline location. It is unclear how an energy recovery facility would be viewed by the Commission.

Facility located in Coastal Zone - State and Regional Coastal Commission. Land use along the California coast is regulated by the California Coastal Commission. Regional commissions will continue to issue development permits until local governments along the coast have State-certified local coastal plans. The regional commissions will be responsible for carrying out the coastal policies until that time; after that the city or county will be responsible for carrying out State coastal policies through its own permit process.

To obtain a permit from the Coastal Commission the resource recovery facility must show consistency with the policies as stated in the 1976 Coastal Act. The Act includes policies on marine and land environment, public access, recreation, industrial development.

An energy recovery facility would have to be consistent with policies that protect the coastal resources. The coastal legislation allows for location of power plants in the coastal zone and for coastal-dependent industrial development especially if placed near existing sites. The Coastal Act defines "coastal-dependent development or use" as any development or use which requires a site on, or adjacent to, the sea to be able to function at all. It is not clear whether resource recovery facilities would fall into either category; the size and type of system may be a determinant.

Facility located on State lands - State Lands Commission. The State of California retains control over the beds of naturally navigable waters, tide and submerged land, and swamp and overflow lands.

In the case where the proposed site of an energy recovery facility is on state land, a lease or permit must be obtained from the State Lands Commission.

Also if pipelines, conduits or power lines cross state land, a least for right-of-way must be obtained. This provision would also include utilities, outfall lines, and sewer owned by a governmental entity. SLC also charges expense fees and rental rates.

Approval of a permit or lease will depend on the applicant showing that the project conforms to trust purposes: preservation of the public right to commerce, navigation or fisheries on the public land.

In addition, as a result of the California Coastal Act of 1976, SLC has adopted criteria for protecting the coast, including statements on coastal-dependent industrial facilities.

b) Environmental Quality

Fish and Wildlife Resources - State Department of Fish and Game/U.S. Fish and Wildlife Service. A resource recovery facility may potentially impact fish and wildlife through alteration of habitat or changes in water quality. State and Federal regulatory agencies normally request review and comment from the State Department of Fish and Game and from the U.S. Fish and Wildlife Service to determine these types of impacts. These two agencies, while without permit authority, recommend action on the project or suggest mitigation measures as conditions of approval.

Navigable waters - U.S. Corps of Engineers. A facility that would in any way encroach on navigable waters or that would discharge fill material wold be subject to U.S. Corps of Engineers approval. A permit would be required for such activities; approval is based on an interpretation that the project is in the public interest.

c) Health and Safety

Vessel Safety - U.S. Coast Guard. In the event that barges were used to transport wastes to an energy recovery facility, the vessels' construction and equipment would have to meet the safety standards set by the U.S. Coast Guard. The movement of barges in the Bay would also be subject to Coast Guard safety requirements.

d) Marketing Arrangements

Sale of Electricity - Federal Energy Regulatory Commission. An energy recovery facility would not require licensing by the Federal Energy Regulatory Commission. However, if interstate wholesaling of electricity was contemplated, FERC would be involved in approving rates.

F. PUBLIC ACCEPTANCE AND POLITICAL ACCOUNTABILITY

The public acceptability of an energy recovery facility will be governed in large part by the perceptions of citizens affected by the project. People will tend to perceive a project in terms of its impacts on their lives.

An energy recovery facility will probably have a great deal of appeal to the public at large and particularly to citizens of the community that will have an alternative disposal method for its solid waste (and perhaps sewage sludge, too), as well as the potential for a further supply of electric power. In other words, many of the impacts will be perceived as positive.

On the other hand, the facility will have other impacts besides those on solid waste disposal and generation of electricity. Project construction, operation and maintenance will have certain implementation costs, and the plant's cost-effectiveness will probably play an important role in determining public acceptability. On top of this, the project will have impacts on jobs, housing, air quality, water quality, etc.

The costs and benefits associated with the facility will probably be given ample publicity by the media, because such a project demonstrates new and interesting technologies designed to solve several problems at the same time. In short, an energy recovery facility is "newsworthy." The combined costs and benefits, as described and publicized by the media, will be very important in creating or destroying public acceptance of the proposal.

This acceptance will be most important during the feasibility study and planning stages - before final decisions have been made and while public viewpoints have the greatest chance of being influential in these project-related decisions. Public acceptance of the project may change after implementation, but by this time its effect might not be so potent.

Political accountability in managing the project is slightly different but related to public acceptance. If the management agency of an energy recovery facility is a public body, its board of directors will be subject to the political process. In the case where management is by a city, county, or any combination thereof, public acceptance will be most closely linked to political accountability because the city council or board of supervisors, members of which are elected at regular intervals, will need to assume direct political responsibility for the project.

On the other hand, if the project is under the direction of a special district, it is probable that this agency's board of directors will be somewhat more insulated from political accountability, than city and county elected officials.

This depends to some degree on the type of special district involved. In many cases a district board of directors is elected directly, but in others, members are appointed by another public body or leadership is assumed by another public body. Also, special districts of all forms tend to have a lower visibility to the public than general purpose governments.

Political accountability by a private business managing an energy recovery facility is another matter. The main purpose of a business enterprise is to make a profit, not necessarily to be accountable to the public. Of course, the two often are inextricably linked, especially when the products or services of a firm are available to the public on an open market. In the case of a private electrical utility or solid waste franchisee, though, most citizens are given little or no choice in the matter. They buy their electricity and solid waste services from the single choice available to them.

Political accountability of a private management agency, therefore, must refer back to the public agencies regulating them. The electrical utility must be accountable to the State Public Utilities Commission, among other agencies. The solid waste franchisee must be accountable to the local government that chose to give it the franchise agreement. Other agencies would be effective in this regard as well - those regulating air and water quality emissions from an energy recovery facility, for example. Thus, although a private management agency might itself be isolated from direct political accountability, the public agencies regulating the business and its project would assume this responsibility during and after the implementation process.

CHAPTER III.

SUMMARY

There is not, at this time, a clear pathway to successful establishment of a waste-to-energy project in the Bay Area. In each step of the implementation process, planners will face obstacles and potential pitfalls. Most can be overcome and avoided through careful attention to details of intergovernmental and public/private arrangements and public reassurance. Some may not be solved until legal, technological or economic precedents have been established to break down hesitancy to try something new. Still others, such as meeting air quality regulations, may require administrative or legislative change at State or Federal levels.

This chapter summarizes the principal issues cited in the six categories of arrangements and relationships discussed in Chapter II, noting those that are still unresolved.

A. Arrangements for Marketing of Products

The first step in planning a waste-to-energy facility is identification of the market (user) of the fuel or energy to be produced by the facility. The user determines the form of energy product needed and in turn the type, size and location of the facility. The quantity of wastes required severely limits alternatives available to communities with populations under 50,000. Because of the wide range of prices now being paid for fossil fuel, it is advisable to survey all potential fuel markets before selecting a particular end user or process.

Steam electric power plants, industrial operations and central heating/cooling plants are the most likely market outlets for solid waste fuels in the Bay Area. Production of steam for electric power generation poses special problems of distance and timing of supply and demand. There often is need for a backup supply.

According to a State Solid Waste Management Board funded survey, potential Bay Area industrial markets for refuse derived fuel or refuse generated steam expressed interest but also reservations because of remaining uncertainties about the reliability of technology and the availability of a constant waste supply. Some of their concerns included:

- o use of pellets has not been demonstrated on a large scale;
- o combustion of RDF has only been done on a demonstration basis and only on former coal-fired furnaces; and
- o virtually no potential industrial users in the Bay Area have burners capable of burning refuse derived fuel.

At present, then, municipal and private electric utilities are the most promising markets. Successful precedents, established in the Bay Area and elsewhere in the country, will help overcome the hesitation about RDF now expressed by many potential local industrial markets.

B. Arrangements for Assuring Waste Supply

It is essential that firm arrangements for waste supply be agreed to at the beginning of the planning period. While arrangements to assure an adequate waste supply may involve a number of parties, there are no potential problems that cannot be resolved by careful planning and negotiations. Factors to be taken into account in making arrangements for the flow of wastes include:

- ownership of the waste; and
- responsibility for front-end separation, processing to specifications, transportation, and disposal of solid waste and resource recovery residues.

Arrangements to assure the waste supply are simplest when the jurisdiction planning the facility generates sufficient wastes to operate it. The complexities attendant upon arrangements to secure an ample waste supply from a number of jurisdictions may influence a decision for a smaller facility.

Technically and economically successful projects in other parts of the United States have run into difficulties in obtaining commitments from enough communities to assure a stable waste supply. The Bay Area has a long history of good relationships between local governments and the refuse removal industry. It is hoped that this history, and the fact that many jurisdictions and their franchisees face a landfill crisis, will enable Bay region projects to negotiate waste supply and disposal agreements without significant contention or delay.

C. Arrangements for Project Implementation and Financing

Many different institutional forms that are possible for the management agency for an energy recovery facility are discussed in Section II.C. Several of these arrangements are now illustrated in the Bay Area.

A number of areas of uncertainty regarding financing of energy recovery facilities remain. Legal precedents may be necessary to clarify some of them; technologically and economically successful operations of similar projects in other parts of the country will remove others. Experience is needed in untried but promising financing mechanisms.

The logical choice of a management agency would appear to be the agency controlling the waste stream. However, ownership of the waste by the franchisee (in most cases) and the equitable distribution of the profits from the sale of the wastes to an energy generator, between the franchisee and the community planning the facility, are unresolved

issues, and may be the subject of litigation. To obtain a share of the benefits for the community in the form of reduced collection rates, a city could attempt to renogotiate the terms of its existing franchise agreement. These agreements are generally for a number of years, however, and a "mid-term modification" can only be made if both parties voluntarily agree to it.

If a private utility or franchisee is the management agency, it would have to get a Public Utilities Commission certificate if it generated electricity to sell to another entity. A municipally operated utility does not have this constraint.

A joint powers agency of local jurisdictions has to deal with the issue of ownership of wastes by one or more private franchisees.

A non-profit corporation involving public agencies and private franchisees would solve the waste ownership and supply issue. However, although a non-profit corporation can issue bonds without a vote of the electorate, the financial arrangements are complex and time-consuming and these bonds are not considered as secure as general obligation bonds and command a higher interest rate.

Successful precedents for waste-to-energy technology and the quality of the product are needed to attract private investment in these facilities. Investors do not trust project revenues and want taxing power as security against default.

While it appears possible that Joint Powers Agency bonds can be used to finance energy recovery projects, there is no judicial determination on this issue.

Leveraged leasing, though new and not yet used for energy recovery facilities, is a relatively inexpensive financial package and appears quite promising for public/private financing arrangements.

Investment in pollution control equipment (energy recovery facilities) diverts capital from other programs such as housing, economic development, etc. Depending on the method of financing used, e.g., increased collection or utility rates, impacts could be more severe on lower income households in the service area.

Federal and State grants are not a reliable source of funds.

D. Arrangements for Risk Management of Projects

This is another institutional area where careful consideration of all factors is essential, but where there are no insurmountable obstacles.

Categories of risk of most concern to participants in an energy recovery facility are those that affect project economics and system reliability:

- o the quantity and quality of wastes for processing;

- o the costs of constructing and operating the system;
- o the revenues from the sale of recovered products; and
- o the ability to dispose of solid waste and resource recovery residuals in an environmentally acceptable manner.

Risks are managed by reduction and by allocation among project participants. Special attention should be paid to the procurement methods selected for design and construction of facilities since they have a direct influence on many of the risk management arrangements among project participants.

E. Permits and Other Requirements

Air Quality

Regulations administered by the Bay Area Air Quality Management District to protect air quality are the foremost hurdle in the permit approval process for waste-to-energy projects. While potential problems in the other types of arrangements discussed in this report can usually be resolved by careful planning and negotiations, it may be that obstacles presented by air quality regulations cannot be overcome without legislative or administrative change at the State level.

Two kinds of regulations are applicable to these projects: emission limitations and new source review. All proposed projects must meet emission limitations contained in Regulations 2 and 7. It is not anticipated that these limitations pose a technical problem, though costs of control technology may be a significant burden.

At present, there are three ways in which New Source permits could be granted to projects:

- o Projects could either be sized or otherwise designed to emit less than 25 lbs/hr or 250 lbs/day of any pollutant (15 lbs/hr or 150 lbs/day if the Best Available Control Technology requirement is to be avoided);
- o Emission offsets could be identified and/or acquired; or
- o An exemption could be granted, based on any one of three grounds--providing essential public services, use of innovative technology or extraordinary environmental or public health benefits to accrue from the project.

As noted in the discussion in Section II.E, "extraordinary environmental or public health benefits" are undefined at present. It is in the interest of Bay Area jurisdictions planning waste to energy facilities (as well as of State and Federal solid waste and energy agencies, and potential energy markets) that a regional approach be taken to resolve this issue. No single jurisdiction or project can make a case for significant environmental benefits. Both the assessment of the

regionwide air quality effects of several waste-to-energy plants, and quantification of the overall environmental impacts accruing to a network of these facilities is necessary. Impacts to be assessed would include:

- o reduction of wastes going to landfills regionwide, resulting in prolonged life of landfills;
- o landfill disposal needs for residues of energy systems;
- o resources recovered and recycled;
- o natural resources conserved;
- o energy savings from use of recycled materials rather than production of new materials from virgin resources;
- o fuel savings in reduction of truck travel to landfills; and
- o reduction in air emissions resulting from reduction in vehicle miles traveled by refuse trucks.

New Source permit exemptions could be granted if study results can demonstrate that:

- o there would be no significant air quality impact on a regional basis as a result of implementing a number of waste-to-energy projects in the Bay Area; and
- o extraordinary environmental and public health benefits would accrue to the region from the proposed projects (energy production, land, material and energy resource conservation).

If this kind of documentation cannot justify New Source Permit exemption, and mitigation measures or offset requirements are economically infeasible, modification of the New Source Review Rule will be necessary. This will require resolution at the State level of the impasse between the State's solid waste, resource conservation and recovery, and energy conservation and development goals on the one hand, and air quality standards on the other, if local governments in the Bay Area, in cooperation with the private sector, are to implement large-scale solid waste to energy recovery projects.

Other requirements can be troublesome:

The State Department of Fish and Game and the U.S Fish and Wildlife Service do not have permit authority. However, their adverse comments often exert a profound influence on other agencies that do have regulatory power, but whose criteria concerning acceptable development are unclear, ambiguous or silent regarding energy recovery facilities, e.g., the U.S. Corps of Engineers, the Bay Conservation and Development Commission and the California Coastal Commission.

Public information and participation are requirements of both Federal and State resource recovery grant programs, and must be built into the feasibility study and planning process.

F. Public Acceptance and Political Accountability

The combined costs and benefit of a proposed project, as described and publicized by the media during the feasibility study and planning stages, will be very important in creating or destroying public acceptance of the proposal. Information supplied to the media, and in public participation events sponsored by the project planners, needs to be candid about costs, in addition to promoting the environmental and energy benefits. For the project to be economically acceptable to the public, they must be given the facts on implementation costs and reassurance that the financing plan distributes costs equitably. They must also be reassured as to health, safety and aesthetic factors.

A closely related issue that the public needs to understand is political accountability. If the management agency is a local government, its board or council is subject to the political process and is directly accountable to the public. A special district board of directors is somewhat more removed from political accountability.

When the management agency is a private business or utility, the public has no direct influence on operations, product or services. Political accountability of private management agencies is to the government agency regulating them--the electric utility to the Public Utilities Commission, the solid waste franchisee to the local government franchisor. To influence decisions of the private management agency, citizens must work through the regulating agencies.

APPENDICES

A. BIBLIOGRAPHY

B. FULL TEXT OF NEW SOURCE REVIEW RULE (December 20, 1977)

APPENDIX A. BIBLIOGRAPHY

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State of California

AIR RESOURCES BOARD

Resolution 77-53

December 20, 1977

WHEREAS, the federal Clean Air Act (§ 110) and the Environmental Protection Agency regulations adopted pursuant thereto (40 CFR 51.12(b)) require that State Implementation Plans contain rules and regulations which prohibit the construction of a new emission source, or a modification to an existing source, where the new or modified source will interfere with or prevent the attainment or maintenance of a national air quality standard;

WHEREAS, Health and Safety Code §§ 40001 and 41507 require districts to adopt as part of the State Implementation Plan required by Section 110 of the Clean Air Act, rules and regulations necessary to achieve and maintain federal ambient air quality standards and authorize the Board to order revision of district rules and regulations where necessary to that end;

WHEREAS, Health and Safety Code § 42301 requires that district permit systems prohibit the issuance of a permit for the construction, alteration, use or operation of any stationary source where such source will prevent or interfere with the attainment or maintenance of any applicable air quality standard;

WHEREAS, the Board is empowered by Health and Safety Code §§ 41500, 41502, and 41504 to review the rules and regulations of a district to determine whether they make reasonable provision to achieve and maintain state air quality standards and, after a public hearing, to establish rules and regulations for a district which so provide if the district has not established such rules and regulations;

WHEREAS, the Board is required by Assembly Concurrent Resolution 19, adopted August 1977, to review the new source review regulations of California air pollution control districts and to propose amendments to improve the consistency and effectiveness of such rules throughout the state;

WHEREAS, the Board is requested by Senate Concurrent Resolution 17, adopted September 1977, to review California's State Implementation Plan and consider revising such plan to permit community-wide trade-offs in the preconstruction review of new or modified stationary sources;

WHEREAS, the Board finds that the Bay Area Air Pollution Control District has not adopted new source review rules or regulations which adequately require the denial of a permit for the construction, alteration, or operation of emission sources which will prevent or interfere with the attainment or maintenance of the state ambient air quality standards;

WHEREAS, the Board finds that without new source review rules substantially equivalent to those proposed for adoption by the staff, the rules and regulations of the Bay Area Air Pollution Control District do not make reasonable provision to achieve and maintain state and national ambient air quality standards;

WHEREAS, the Board finds that the Bay Area Air Pollution Control District has failed to adopt new source review rules which meet the aforesaid federal requirements for State Implementation Plans;

WHEREAS, the Board finds that the Bay Area Air Pollution Control District has failed to adopt rules consistent with other new source review rules throughout the state so as to achieve a substantial degree of uniformity; and

WHEREAS, the Board has conducted a public hearing and given notice thereof in accordance with all requirements of federal and state law;

NOW, THEREFORE, BE IT RESOLVED, that the Board hereby amends the rules and regulations of the Bay Area Air Pollution Control District by adopting and amending Sections 1304, 1306, 1306.1, 1306.2, 1306.3, 1307, 1308, 1309, 1310, 1311, 1311.1, 1311.2, of Regulation 2, Division 13, as indicated on Attachment I hereto.

BE IT FURTHER RESOLVED, that the aforesaid sections as amended shall become effective immediately.

BE IT FURTHER RESOLVED, that the aforesaid sections as amended shall apply to any subject application for a permit filed with the District, but not finally ruled upon, prior to the aforesaid effective date.

BE IT FURTHER RESOLVED, that the staff of the Board, together with the staff of the District, monitor the implementation of these new source review rules and report to the Board the effects on air quality, employment and business in the District by January 1979.

BE IT FURTHER RESOLVED, that the aforesaid sections as amended may not be amended except by the Board, or by the District provided that the Executive Officer finds that any amendment thereto made by the District does not impair the overall effectiveness or flexibility of these sections.

Bay Area Air Pollution Control District

New Source Review Rules

Section 1304.	Applications
Section 1306.	Action on Applications
Section 1306.2.	Appeals from the Denial of Applications
Section 1306.3.	Appeals from the Approved, Conditional Approval or Denial of Source Subject to Sections 1308, 1309, or 1310
Section 1307.	Denial -- Failure to Meet Emission Regulations
Section 1307.1	Denial -- Failure to meet State Implementation Plan and District Regulations
Section 1308.	Standards for Authorities to Construct: Best Available Control Technology
Section 1309.	Standards for Authorities to Construct: Air Quality Impact Analysis
Section 1310.	Standards for Authority to Operate
Section 1311.	Definition for Sections 1308, 1309, and 1310
Section 1311.1.	Additional Applicant Requirements
Section 1311.2.	Severability

Adopted December 20, 1977 by the Air Resources Board to be effective immediately and to apply to any subject application filed with the District, but not finally acted upon prior to December 20, 1977.

§ 1304 Applications. Every application for an authority to construct, erect, alter or replace, or an authority to operate, shall be submitted to the APCO on a form specified and contain all the information required by him. When deemed appropriate by the Air Pollution Control Officer, he shall consult with appropriate local and regional agencies to check the accuracy and adequacy of the application, and of other information submitted with or concerning the application, and to determine whether the application conforms with adopted plans and with local permit requirements.

§ 1306 Action on Applications. The APCO shall act as soon as possible but not later than 60 days from the receipt of a completed application, unless extended by written consent of the applicant, for an authority to construct, erect, alter or replace or authority to operate, and shall notify the applicant in writing of his approval, conditional approval, or denial. This provision shall not apply to applications for sources subject to Sections 1308 or 1309 or 1310 of this Regulation.

§ 1306.2 Appeals from the Denial of Applications. An applicant for a permit dissatisfied with the decision of the APCO may appeal to the Hearing Board for an order modifying or reversing the decision of the APCO by filing an appeal in writing within 10 days of notification of the decision of the APCO. This provision shall not apply to Sections 1308, 1309, or 1310 of this Regulation.

§ 1306.3 Appeals from the Approval, Conditional Approval or Denial of a Source Subject to Sections 1308, 1309, or 1310. An applicant for a permit, for a source subject to Sections 1308, 1309, 1310, or any person dissatisfied with the decision of the APCO thereon, may appeal to the Hearing Board for an order modifying or reversing the decision of the APCO. An appeal pursuant to this section must be filed in writing with the Hearing Board within 10 days of the date of publication of notice of the decision of the APCO and shall contain a summary of the issues to be raised. The Hearing Board shall consider the appeal pursuant to its rules at a public hearing within 30 days of such filing.

§ 1307 Denial -- Failure to Meet Emission Regulations. The Air Pollution Control Officer shall deny an authority to construct, erect, alter or replace, if the stationary source, facility, building, article, machine, equipment or other contrivance, the use of which may cause the emission of air contaminants, or the use of which may eliminate, reduce or control the emission of air contaminants, when operated, will not comply with the emission regulations of the District.

§ 1307.1 Denial -- Failure to meet State Implementation Plan and District Regulations. The Air Pollution Control Officer shall deny an authority to construct, erect, alter or replace a stationary source, facility, building, article, machine equipment or other contrivance, unless the applicant demonstrates that all facilities in the Air Basin which are owned or operated by the applicant are in compliance with all applicable district rules, regulations and orders, and all applicable requirements of the State Implementation Plan approved or promulgated by the federal Environmental Protection Agency under Section 110 of the Clean Air Act, including approved compliance schedules or enforcement orders issued under Section 113 of the Clean Air Act.

§ 1308 Standards for Authorities to Construct: Best Available Control Technology

(a) New Stationary Sources:

The Air Pollution Control Officer shall deny an authority to construct for any unit or units constituting a new stationary source if such source will emit more than 15 pounds per hour or 150 pounds per day of nitrogen oxides, organic gases, or any contaminant for which there is a state or national ambient air quality standard (except carbon monoxide, for which the limits are 150 pounds per hour and 1500 pounds per day) unless the applicant shows that the new source is constructed using best available control technology.

(b) Modifications to Existing Stationary Sources:

The Air Pollution Control Officer shall deny an authority to construct for any modification of any existing stationary source if such source after modification will emit more than 15 pounds per hour or more than 150 pounds per day of nitrogen oxides, organic gases, or any air contaminant for which there is a state or national ambient air quality standard (except carbon monoxide, for which the limits are 150 pounds per hour and 1500 pounds per day), unless the applicant demonstrates that the modification of the existing stationary source will be constructed using best available control technology, and;

1. That the modification would not result in a net increase in emissions of any pollutant affected by this subsection; or

2. That best available control technology is being, or is to be, applied to all existing units of the stationary source; or

3. That emissions from all of the existing units of the stationary source are controlled by use of technology that is at least as effective as that generally in use on similar stationary sources, and that the cost of installing best available control technology on existing units is economically prohibitive and substantially exceeds the cost per unit mass of controlling emissions of each pollutant through all other control measures; or

4. That the stationary source is a small business, as defined in subsection (1) of Section 1896 of Title 2 of the California Administrative Code; that emissions from all existing units of the stationary source are controlled through application of the best technology that is economically reasonable to apply to that stationary source; and that the cost of employing best available control technology is economically prohibitive.

§ 1309 Standards for Authorities to Construct: Air Quality Impact Analysis

(a) New Stationary Sources:

The Air Pollution Control Officer shall deny an authority to construct for any unit or units constituting a new stationary source if such source will emit more than 25 pounds per hour or 250 pounds per day of nitrogen oxides, organic gases, or any air contaminant for which there is a state or national ambient air quality standard (except carbon monoxide, for which the limits are 250 pounds per hour and 2500 pounds per day), or which is a precursor of any such air contaminant, unless the Air Pollution Control Officer determines that the emissions from the new source will not cause a violation of, or will not interfere with the attainment or maintenance of, the state or national ambient air quality standard for the same contaminant, (or in the case of a precursor, for that contaminant to which the precursor contributes).

(b) Modifications to Existing Stationary Sources:

The Air Pollution Control Officer shall deny an authority to construct for any modification of any existing stationary source if the modification will result in a net increase in emissions from the existing source of more than 25 pounds per hour or 250 pounds per day of nitrogen oxides, organic gases, or any air contaminant for which there is a state or national ambient air quality standard (except carbon monoxide, for which the limits are 250 pounds per hour and 2500 pounds per day), or which is a precursor of any such air contaminant, unless the Air Pollution Control Officer determines that the emissions from the modified source will not cause a violation of, or will not interfere with the attainment or maintenance of, the state or national ambient air quality standard for that same contaminant, (or in the case of a precursor, for that contaminant to which the precursor contributes).

(c) Determination of Emission Increases:

In determining under Section 1308(b)1 and Section 1309(b) whether there has been a net increase in emissions and, if so, the amount of any such increase, the Air Pollution Control Officer shall consider all increases and decreases of emissions caused by modifications to that stationary source pursuant to authorities to construct issued during the preceding five years, or since the adoption of this Section, whichever period is shorter. Emission reductions required to comply with federal, state, or district laws, emission limitations, or rules or regulations shall not be considered to be decreases in emissions for the purpose of this subsection.

(d) Consideration of Future Emission Reductions: Trade-offs

In making the analysis required in subsection (g)2., the Air Pollution Control Officer shall take into consideration the air quality impact of any trade-off resulting from reductions in the emissions of the same air contaminant which are due to the elimination or modification of other existing stationary sources under the same ownership and operating within the same Air Basin. If reductions are to be based on planned elimination or modification of any such stationary sources, the Air Pollution Control Officer shall condition the permit to operate to require

such elimination or modification within not more that 90 days after the start-up of the new or modified source. Emission reductions required to comply with federal, state, or district laws, emission limitations, or rules or regulations shall not be considered to be decreases in emissions for the purposes of this subsection.

If an applicant proposes to obtain trade-offs pursuant to this subsection, the applicant must demonstrate that there will be a net decrease in the emissions of all air contaminants emitted by the new or modified stationary source and that there will be no net air quality deterioration within the Air Basin or within adjoining air basins.

(e) Exemptions:

1. The Air Pollution Control Officer shall exempt from subsections (a) and (b) of this Section any new stationary source or modification of any existing stationary source which:

   A. Will be in whole or in part a replacement for an existing stationary source on the same property if the resulting emissions of any air contaminant will not be increased. The Air Pollution Control Officer may allow a maximum of 90 days as a start-up period for simultaneous operation of the existing stationary source or replaced portions thereof, and the new stationary source or replacement; or

   B. Will cause demonstrable air quality benefits within the Air Basin, provided however, that the written concurrence of the California Air Resources Board and United States Environmental Protection Agency shall be obtained prior to the granting of an exemption hereunder. In order to show that a proposed new stationary source or modification to an existing stationary source will cause demonstrable air quality benefits within the Air Basin, an applicant must provide emission reductions or trade-offs at existing sources; or

C. Will be used exclusively for providing essential public services such as schools hospitals, or police and fire fighting facilities, but specifically excluding sources of electrical power generation other than for emergency standby use at essential public service facilities; or

D. Is exclusively a modification to convert from use of gaseous fuels to fuel oil because of demonstrable shortage of gaseous fuels, provided: (i) that all units constituting the modification will utilize best available control technology and provided that use of fuel oil would have been permitted under district regulations at the time of construction of the equipment using gaseous fuels without the source having been required at that time to install control equipment in addition to that which it would have to install in order to be able to be exempt hereunder and (ii) the applicant demonstrates that it made its best efforts to obtain sufficient emission trade-offs under this rule, that such efforts were unsuccessful, and that it will continue to seek the necessary emission trade-offs and apply them when they become available. Modifications for the purpose of this subparagraph shall include the addition or modification of facilties for storing, transferring and/or transporting such fuel oil at the stationary source. A condition shall be placed on the operating permit requiring conversion to gaseous or other equivalent low polluting fuels when they are, or become available; or

E. Is air pollution control equipment which, when in operation, will reduce emissions from an existing source; or

F. Is portable sandblasting equipment used on a temporary basis within the Air Basin.

2. The Air Pollution Control Officer may exempt from subsections (a) and (b) of this Section, any new stationary source, or modification of an existing stationary source, which has been determined to be:

   A. A new stationary source or modification of an existing stationary source utilizing unique and innovative control technology which will result in a significantly lower emission rate from the stationary source than would have occurred with the use of previously known best available control technology, and which will likely serve as a model for technology to be applied to similar stationary sources within the State. In order for a stationary source to be exempted under this subparagraph, the applicant must obtain the written concurrence of the California Air Resources Board and the United States Environmental Protection Agency with the Air Pollution Control Officer's determination; or

   B. A new stationary source or modification of an existing stationary source that represents a significant advance in the development of a technology that appears to offer extraordinary environmental or public health benefits or other benefits of overriding importance to the public health or welfare. In order for a stationary source to be exempted under this subparagraph, the applicant must obtain the written concurrence of the California Air Resources Board and the United States Environmental Protection Agency with the Air Pollution Control Officer's determination.

(f) Notice Requirements for Proposed Exemptions:

Before granting an exemption under subsection (e) 1. B., (e) 2. A., or (e) 2. B. of this Section, the Air Pollution Control Officer shall publish a notice by prominent advertisement in at least one newspaper of general circulation in the District and shall notify in writing of his intention: The applicant, the United States Environmental Protection Agency, the California Air Resources Board, and adjoining air pollution control districts. Calculations and technical data used by the Air Pollution Control Officer as the basis for granting exemptions pursuant

to subsection (e) 1. B., (e) 2. A., or (e) 2. B. shall be made available to the California Air Resources Board and the United States Environmental Protection Agency. Before granting an exemption under subsection (e) 1. B., (e) 2.A. or (e) 2. B. of this Section, the Air Pollution Control Officer shall consider any comments received within 30 days after the date of publication or date of notification of the above agencies, whichever occurs later, and shall have obtained the concurrence of the California Air Resources Board and the United States Environmental Protection Agency.

In addition, the Air Pollution Control Officer shall notify in writing the United States Environmental Protection Agency and the California Air Resources Board within 15 days of the granting of an exemption under subsection (e) 1. A., (e) 1. C., or (e) 1. D.

(g) Procedure for Evaluation of Applications for Authorities to Construct:

Before granting an authority to construct for any unit of a new stationary source or modification subject to the requirements of subsections (a) and (b) of this Section, the Air Pollution Control Officer shall:

1. Require the applicant to submit information sufficient to describe the nature and amounts of emissions, location, design, construction, and operation of the source, and to submit any additional information required by the Air Pollution Control Officer to make the analysis required by this Section.

2. Analyze the effect of the operation of the new or modified stationary source on air quality in the vicinity of the new source or modified stationary source, within the Air Basin and within adjoining air basins. Such analysis shall consider the air contaminant emissions and air quality in the vicinity of the new source or modified source, within the Air Basin and within adjoining air basins at the time the new source or modification is proposed to commence normal operation. Such analysis shall be based on the application of existing federal, state, and local rules and regulations.

3. Upon completion of the evaluation, but before granting an authority to construct:

   A. Publish a notice by prominent advertisement in at least one newspaper of general circulation in the District, indicating the preliminary decision to grant the authority to contruct and stating where the public may inspect the information required by this subsection. A copy of the notice shall also be sent to the applicant, the United States Environmental Protection Agency, the California Air Resources Board and adjoining air pollution control districts. The notice shall provide a period of 30 days, beginning on the date of publication, or on the date of notification of the above agencies, whichever occurs later, for the public to submit comments on the application.

   B. Make available for public inspection at the Air Pollution Control District office, except as otherwise limited by law: the information submitted by the applicant, the Air Pollutant Control Officer's analysis of the effect of the source on air quality, and the preliminary decision to grant the authority to construct. Such information shall also be forwarded to the California Air Resources Board for review.

   C. Consider all comments submitted. If within the 30-day notice period the Air Pollution Control Officer receives a written request from either the United State Environmental Protection Agency or California Air Resources Board to defer the Air Pollution Control Officer's decision pending the requesting agency's review of the application, the Air Pollution Control Officer shall honor such request for a period of 60 days from the date of such request.

§ 1310 Standards for Authority to Operate:

(a) Requirement for Authority to Construct as Condition for Authority to Operate:

The Air Pollution Control Officer shall deny an authority to operate for any stationary source subject to the requirements of Sections 1308 and 1309 unless the applicant has obtained an authority to construct.

In addition the Air Pollution Control Officer shall deny an authority to operate any stationary source, facility or building, article, machine, equipment or other contrivance for which an authority to construct or operate is required, if it is not constructed substantially in conformance with the authority to construct, or if the use or operation according to design standard does not comply with the regulations of the Board.

(b) Air Quality Impact Analysis for Sources Emitting Larger Quantities of Air Contaminants Than Assumed in the Analysis Performed Pursuant to Section 1309:

The Air Pollution Control Officer shall not grant an authority to operate to any stationary source the APCO determines emits quantities of air contaminants larger than were assumed in the analysis performed for the authority to construct for the source, unless the Air Pollution Control Officer performs the air quality impact analysis required by Section 1309 and determines that the actual emissions from the source will not cause a violation of, or will not interfere with the attainment or maintenance of, any state or national ambient air quality standard.

(c) Conditions on Authorities to Operate or Authorities to Construct:

The Air Pollution Control Officer shall condition the issuance of an authority to operate, and an authority to construct on such terms as are deemed necessary to ensure that the stationary source will be constructed and operated in the manner assumed in making the analysis required by Section 1309 or subsection (b) of this Section whichever is applicable. Where appropriate, such conditions shall prohibit a new stationary source which is a replacement for an existing stationary source from operating unless the operation of the existing source is terminated. The Air Pollution Control Officer may allow a maximum of 90 days as a start-up period for simultaneous operation of the existing stationary source or replaced portion thereof, and the new stationary source or replacement portions thereof.

(d) Exemptions:

The Air Pollution Control Officer shall exempt from the provisions of this Section any stationary source which:

1. Has received an authority to construct prior to this amendment of Section 1309, provided however, that any such source will be required to obtain an authority to operate in accordance with the provisions of this Division which were in effect prior to this amendment of Section 1310, and provided further that any exemption granted hereunder shall not apply to any subsequent modification of such source.

2. Is a continuing operation, without modification, of a stationary source that was previously exempt from the permit provisions of these Regulations and an authority to operate is required solely because of a change in permit exemptions stated in Section 1316.

§ 1311 Definitions for Sections 1307, 1307.1, 1308, 1309, 1310, and 1311.1

(a) STATIONARY SOURCE means a unit or an aggregation of units of nonvehicular air-contaminant-emitting equipment which is located on one property or on contiguous properties; which is under the same ownership or entitlement to use and operate; and, in the case of an aggregation of units, those units which are related to one another. Units shall be deemed related to one another if the operation of one is dependent upon, or affects the process of, the other; if their operation involves a common or similar raw material, product, or function; or if they have the same first three digits in their standard industrial classification codes as determined from the Standard Industrial Classification Manual published in 1972 by the Executive Office of the President, Office of Management and Budget.

In addition, in cases where all or part of a stationary source is a facility used to load cargo onto or unload cargo from cargo carriers, other than motor vehicles, the Air Pollution Control Officer shall consider such carriers to be parts of the stationary source. Accordingly, all emissions from such carriers (excluding motor vehicles) which will result in an adverse impact on air quality in the State of California shall be considered as emissions from such stationary source. Emissions from such carriers shall include those that result from operation of the carriers' engines; the purging or other method of venting of vapors; and from the loading, unloading, storage, processing, and transfer of cargo.

(b) MODIFICATION means any physical change in, or any change in the method of operation of, a stationary source.

For the purpose of this definition:

1. Routine maintenance or repair shall not be considered to be physical changes, and

2. An increase in production rate or operating hours shall not be considered to be a change in the method of operation, provided that these increases are not contrary to any existing authority to operate conditions.

(c) BEST AVAILABLE CONTROL TECHNOLOGY means the maximum degree of emission control for any air contaminant emitting equipment, taking into account technology which is known but not necessarily in use, provided that the Air Pollution Control Officer shall not interpret best available control technology to include a requirement which will result in the closing and elimination of or inability to construct a lawful business which could be operated with the application of the best available control technology currently in use.

§ 1311.1 Additional Applicant Requirements:

Receipt of an authority to construct or an authority to operate shall not relieve the stationary source owner or operator of the responsibility to comply with Sections 1308 or 1309 or any other applicable portions of the District's Rules and Regulations.

§ 1311.2 Severability:

If any portion of Sections 1308, 1309, 1310 or 1311 shall be found to be unenforceable, such finding shall have no effect on the enforceability of the remaining portions, which shall continue to be in full force and effect.

ASSOCIATION OF BAY AREA GOVERNMENTS

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